United States Court of Appeals

for the

District of Columbia Circuit

TRANSCRIPT OF RECORD

FOR MR. JUSTICE VAN ORSDEL

TRANSCRIPT OF RECORD

Court of Appeals of the District of Columbia

OCTOBER TERM, 1930

No. 5307

930

THE TITEFLEX METAL HOSE CO., APPELLANT,

vs.

THOMAS E. ROBERTSON, COMMISSIONER OF PATENTS OF THE UNITED STATES.

APPEAL FROM THE SUPREME COURT OF THE DISTRICT OF COLUMBIA.

FILED OCTOBER 15, 1930.

PRINTED DECEMBER 29, 1930.

Court of Appeals of the District of Columbia

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Court of Appeals of the District of Columbia

No. 5307.

The Titeflex Metal Hose Co., Appellant,
vs.
Thomas E. Robertson, Commissioner, &c.

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a Supreme Court of the District of Columbia.

No. 48467. In Equity.

The Titeflex Metal Hose Co., Plaintiff,
vs.
Thomas E. Robertson, Commissioner of Patents of the United States, Defendant.

United States of America,
District of Columbia, ss:

Be it remembered, that in the Supreme Court of the District of Columbia, at the City of Washington, in said District, at the times hereinafter mentioned, the following papers were filed and proceedings had, in the above-entitled cause, to wit:

1 *Bill to Compel Issuance of Patent.*

Filed June 13, 1928.

In the Supreme Court of the District of Columbia.

No. 48467. In Equity.

The Titeflex Metal Hose Co., Plaintiff,
vs.
Thomas E. Robertson, Commissioner of Patents of the United States, Defendant.

To the Supreme Court of the District of Columbia:

The Titleflex Metal Hose Co. plaintiff herein, brings this, its bill of complaint against Thomas E. Robertson, Commissioner of Patents of the United States, and shows as follows:

I. The plaintiff, The Titeflex Metal Hose Co., is a corporation duly organized and existing under the laws of the State of New Jersey, having an established place of business at No. 500 Freelinghuysen Ave., Newark, New Jersey, and the defendant, Thomas E. Robertson, is a citizen of the United States and Commissioner of Patents of the United States and has his official residence in the City of Washington in the District of Columbia.

II. This is a bill in equity brought under and pursuant to the provisions of Section 4915 of the Revised Statutes of the United States.

III. Louis H. Brinkman, a citizen of the United States, residing at Glen Ridge, County of Essex and State of New Jersey, is the first, sole and original inventor of certain improvements in Tube not known or used by others in the United States before his invention thereof, not patented or described in any printed publication prior to his invention thereof or more than two years prior to his application for Letters Patent of the United States therefor,
2 hereinafter mentioned, not in public use or on sale in the United States more than two years prior to his said application, not abandoned, and for which neither he nor his legal representatives nor assigns has filed application for patent in any foreign country more than one year prior to his said application for letters patent of the United States; and on the 21st day of November, 1919, said Louis H. Brinkman made application according to law for letters patent of the United States for his said improvements or inventions to the Commissioner of Patents of the United States, his said application being serially numbered 339,620.

That said improvements or inventions relate to Flexible Tubes as will more fully appear from the original or a certified copy of the file wrapper and contents of the said application for patent ready here in Court to be produced.

IV. By an assignment in writing executed on the 20th day of November, 1919, duly recorded in the United States Patent Office on the 21st day of November, 1919, in Liber F 109, page 46 of Transfers of Patents, said Louis H. Brinkman being then the sole owner of said improvements or inventions, duly assigned to the Titeflex Metal Hose

Corporation, a corporation organized and existing under the laws of the State of New York, the entire right, title and interest, in and to said improvements or inventions and in and to said application Serially Numbered 339,620 and requested the Commissioner of Patents to issue letters patent thereon to the said Titeflex Metal Hose Corporation, a corporation of New York, and by an instrument in writing executed on the 23rd day of September, 1924, duly recorded in the United States Patent Office on the 7th day of October, 1924, in Liber L 122, page 468 of Transfers of Patents, said Titeflex Metal Hose Corporation, a corporation of New York, being then the sole owner of 3 said improvements or inventions, duly assigned to the plaintiff corporation, the Titeflex Metal Hose Co., a corporation organized and existing under the laws of the State of New Jersey, the entire right, title and interest in and to the said improvements or inventions and in and to said application Serially Numbered 339,620 and requested the Commissioner of Patents to issue letters patent thereon to the plaintiff the Titeflex Metal Hose Co. as will more fully appear from the originals or certified copies of said assignments ready here in Court to be produced; and the plaintiff, the Titeflex Metal Hose Co., is now and has been ever since said assignment, sole owner of said improvements or inventions in said application serially numbered 339,620.

V. The said Louis H. Brinkman in his said application serially numbered 339,620, particularly pointed out and distinctly claimed the part, improvement or combination which he claimed as his invention in and by five claims, and plaintiff alleges that each of said claims states subject-matter of invention of which said Louis H. Brinkman is the first, sole and original inventor as hereinbefore alleged and that each of said claims states subject-matter of invention which is and at all times has been patentable to the plaintiff, the Titeflex Metal Hose Co., as assignee of said Louis H. Brinkman.

The said five claims in said application serially numbered 339,620 are as follows:

1. The combination with a corrugated tube depending for its flexibility on relative movement of the corrugation sides, of a strand outside the corrugations of said tube and bearing upon said corrugations, said strand being

wound helically about said tube and connected to the ends of said tube.

4 2. The combination with a corrugated tube depending for its flexibility on relative movement of the corrugation sides, of strands helically wound about said tube in opposite directions, bearing against said corrugations and connected to the ends of said tube.

3. The combination with a flexible tube comprising a helically disposed strip having a central longitudinal groove forming a corrugation and having the adjacent edges of contiguous convolutions interfolded, said tube depending for flexibility on relative movement of the corrugation sides, of strands wound helically about said tube in opposite directions, bearing against said corrugations and connected to the ends of said tube.

4. The combination with a flexible corrugated tube formed of a helically disposed strip having a central longitudinal groove forming a corrugation and the adjacent edges of contiguous convolutions interfolded, said tube depending for flexibility upon relative movement of the corrugation sides, fittings secured to said tube at its ends, and strands helically wound about said tube in opposite directions bearing against said corrugations and secured to said fittings.

5. The combination with a corrugated tube depending for flexibility upon relative movement of the corrugation sides formed of a helical strip having the edges of adjacent convolutions in engagement, of means for preventing twisting of the said tube whereby tendency to cause sliding in the joint between adjacent convolutions is overcome.

VI. The Primary Examiner of the United States Patent Office in charge of said application serially numbered 339,620 rejected and refused to the plaintiff, as assignee aforesaid, all of the said five claims; this rejection and refusal was duly appealed to the Board of Appeals of the United States Patent Office, assigning errors by the Primary Examiner in rejecting said five claims and not allowing said five claims, and after hearing said appeal the Board of Appeals on the 15th day of December, 1927, affirmed the decision of the Primary Examiner as to said five claims (1 to 5 inclusive). Plaintiff also states that no appeal has been taken to the Court of Appeals of the District of Columbia in this case from the decision of the Board of Appeals of the United States Patent Office.

5 VII. The defendant, Thomas E. Robertson, Commissioner of Patents of the United States, has refused and still refuses to grant letters patent of the United States to the plaintiff, the Titeflex Metal Hose Co., as assignee of said Louis H. Brinkman, on said application serially numbered 339,620 for the improvements or inventions stated in the said five claims (1 to 5 inclusive) recited in paragraph V hereof though said plaintiff, the Titeflex Metal Hose Co. is lawfully entitled thereto and is the sole owner of the entire right, title and interest in and to said improvements or inventions as hereinbefore alleged.

Wherefore, the plaintiff, the Titeflex Metal Hose Co. prays this Honorable Court to adjudge that it is entitled according to law to secure its patent for the said improvements or inventions stated in said five claims (1 to 5 inclusive) recited in paragraph V hereof, or for any part thereof, as the facts in the case may appear, for such other and further relief as may appear to this Honorable Court to be just and equitable and that *subpœna ad respondendum* directed to the Honorable Thomas E. Robertson as he is Commissioner of Patents of the United States, be issued out of and under the seal of this Honorable Court requiring him to appear and to answer unto this bill of complaint but not under oath, an answer under oath being expressly waived, and to do and to receive whatsoever this Court may order in the premises.

THE TITLEFLEX METAL HOSE CO.,
By CHARLES W. FLETCHER,
President.

ROBERT WATSON,
Solicitor for Plaintiff.
THOMAS HOWE,
Of Counsel.

6 STATE OF NEW YORK,
County of New York, ss:

Charles W. Fletcher, being duly sworn, deposes and says that he is President of The Titeflex Metal Hose Co., the plaintiff named in the foregoing bill of complaint; that he has read the same and knows the contents thereof; that the same is true of his own knowledge except as to those matters therein stated to be alleged upon information and belief, and that as to those matters he believes it to be true.

CHARLES W. FLETCHER.

Subscribed and sworn to before me this 12th day of June, 1928.

[SEAL.] AMELIA MAYER,
Notary Public, Queens Co., No. 1329.

Queens Co. Register's No. 1155.
Certificate filed in N. Y. Co.
New York County Clerk's No. 300.
New York County Register's No. O-256.
Commission expires Mar. 30, 1930.

Answer to the Bill of Complaint.

Filed June 27, 1928

* * * * * * *

To the Honorable the Judges of the Supreme Court of the District of Columbia:

I. Defendant admits for the purpose of this suit the allegations of residence and citizenship set forth in Paragraph I, but states that he is a legal resident of Chevy Chase, Md.

II. Defendant admits the allegations of Paragraph II.

III. Defendant admits that Louis H. Brinkman made application for letters patent as specified, but denies
7 that he is entitled to a patent for the claims set forth in the application in view of the prior patents hereinafter mentioned. Defendant has no knowledge of the remaining allegations of Paragraph III except as informed by the Bill and therefore denies them.

IV. Defendant admits for the purpose of this suit all the allegations of Paragraph IV except the allegations of invention.

V. Defendant admits that the application No. 339,620 contains five claims set forth in Paragraph V, but denies that the said claims are patentable to the applicant Brinkman in view of the following patents recited in the decision of the Board of Appeals, viz.:

Kelso et al., 606,557, June 28, 1898,
Smith, 762,954, June 21, 1904,
Witzenmann, 933,516, Sept. 7, 1909,

Witzenmann, 933,934, May 30, 1911,
Rudolph, 1,054,244, Feb. 25, 1913,
Brinkman, 1,198,392, Sept. 12, 1916,
Witzenmann, Fr., 328,650, of 1903.

VI. Defendant admits the allegations of Paragraph VI.

VII. Defendant admits that he has refused and still refuses to grant letters patent to plaintiff and denies that plaintiff is lawfully entitled thereto.

Further answering, defendant denies each and every allegation of the Bill of Complaint not herein specifically or sufficiently denied or admitted.

Wherefore defendant prays that he be hence dismissed with all costs and expenses of the proceedings against the plaintiff, as required by Section 4915 R. S.

THOMAS E. ROBERTSON,
Commissioner of Patents.

T. A. HOSTETLER,
Solicitor for the U. S. Patent Office,
Attorney for Defendant.

8 DISTRICT OF COLUMBIA,
City of Washington, ss:

I, Thomas E. Robertson, depose and say that I have read the above answer by me subscribed and know the contents thereof; and that the statements of facts therein made as upon personal knowledge are true, and those made upon information and belief I believe to be true.

THOMAS E. ROBERTSON.

Subscribed and sworn to before me this 26th day of June, 1928.

[SEAL.] ALBERT W. KAISER,
Notary Public, D. C.

My commission expires April 6, 1933.

Final Decree.

Filed June 27, 1930.

* * * * * * *

This cause having come on to be heard and having been tried in open court and argued by counsel for the respective parties and submitted to the court upon the pleadings and proofs adduced, and upon consideration thereof, it is

Ordered, adjudged and decreed that the Bill of Complaint in this case be, and the same hereby is dismissed with costs to Defendant.

WENDELL P. STAFFORD,
Justice.

June 27, 1930.

9 *Citation.*

Issued July 3″, 1930.

* * * * * * *

The President of the United States, to Thomas E. Robertson, Commissioner of Patents, Greeting:

You are hereby cited and admonished to be and appear at a Court of Appeals of the District of Columbia, upon the docketing the cause therein, under and as directed by the Rules of said Court, pursuant to an Appeal — the Supreme Court of the District of Columbia, on the 3″ day of July, 1930, wherein The Titeflex Metal Hose Co. Appellant, and you are Appellee, to show cause, if any there be, why the Decree rendered against the said Appellant, should not be corrected, and why speedy justice should not be done to the parties in that behalf.

Witness the Honorable Alfred A. Wheat, Chief Justice of the Supreme Court of the District of Columbia, this 3″ day of July in the year of our Lord one thousand nine hundred and thirty.

FRANK E. CUNNINGHAM,
Clerk,
By H. B. DERTZBAUGH,
Asst. Clerk.

Service of the above Citation accepted this 3″ day of July, 1930.

T. A. HOSTETLER,
Attorney for Appellee.

10 *Order for Appeal.*

Filed July 8, 1930.

* * * * * * *

The Clerk of said Court will note an appeal on behalf of the plaintiff in the above-entitled cause from the decree entered herein on the 27″ day of June, 1930.

ROBERT WATSON,
Attorney for Plaintiff.

Order Fixing Bond on Appeal.

Filed July 8, 1930.

* * * * * * *

It appearing to the Court that the plaintiff has noted an appeal herein from the decree of June 27, 1930, it is this 8″ day of July, 1930, ordered:

That the bond on appeal be, and the same is hereby fixed in the sum of One Hundred Dollars ($100.00), or, in lieu thereof, deposit with the Clerk the sum of Fifty Dollars ($50.00) in cash.

JENNINGS BAILEY,
Justice.

Memorandum.

July 14, 1930.—$50 deposit in lieu of Appeal bond.

11 *Assignment of Errors.*

Filed July 14, 1930.

* * * * * * *

Now comes Titeflex Metal Hose Co., plaintiff in the above entitled cause, and says that in the record and proceedings therein there is manifest error, and assign as errors on appeal that the Supreme Court of the District of Columbia erred in this, to wit:

1. In decreeing that the bill of complaint be dismissed, whereas the court should not have dismissed the bill of complaint.

2. In decreeing that the bill of complaint be dismissed, whereas the court should have granted the prayer of the bill of complaint.

3. In decreeing that the bill of complaint be dismissed whereas the court should have adjudged that the plaintiff is entitled according to law to secure its patent for the said improvements or inventions as stated in claim 1 recited in paragraph V of the bill of complaint.

4. In decreeing that the bill of complaint be dismissed whereas the court should have adjudged that the plaintiff is entitled according to law to secure its patent for the said improvements or invention as stated in claim 2 recited in paragraph V of the bill of complaint.

5. In decreeing that the bill of complaint be dismissed whereas the court should have adjudged that the plaintiff is entitled according to law to secure its patent for the said improvements or inventions as stated in claim 3 recited in paragraph V of the bill of complaint.

6. In decreeing that the bill of complaint be dismissed whereas the court should have adjudged that the plaintiff is entitled according to law to secure its patent for the said improvements or inventions as stated in claim 4 recited in paragraph V of the bill of complaint.

12 7. In decreeing that the bill of complaint be dismissed whereas the court should have adjudged that the plaintiff is entitled according to law to secure its patent for the said improvements or inventions as stated in claim 5 recited in paragraph V of the bill of complaint.

8. In decreeing that the bill of complaint be dismissed whereas the court should have adjudged that the plaintiff is entitled according to law to secure its patent for the said improvements or inventions as stated in each and all of the five claims (1 to 5 inclusive) recited in paragraph V of the bill of complaint.

THE TITEFLEX METAL HOSE CO.,
Plaintiff,

By ROBERT WATSON,
THOMAS HOWE,
Their Attorneys and Solicitors.

Designation of Record.

Filed July 14, 1930.

* * * * * * *

To the Clerk:

Plaintiff, appellant, by its attorneys designate the following to constitute the transcript of the record on the appeal in the above entitled cause:

1. Bill of Complaint.
2. Answer.
3. Decree of June 27, 1930.
4. Notation of Appeal.
5. Citation.
6. Order fixing bond (or cash deposit in lieu thereof).
7. Memorandum of deposit of $50.00 in lieu of undertaking on appeal.

13 8. All exhibits mentioned and referred to in the Statement of Evidence. See Statement of Evidence.

9. Statement of Evidence.
10. Assignments of Error.
11. This designation.

ROBERT WATSON,
THOMAS HOWE,
Attorneys for Plaintiff.

Memoranda.

July 17, 1930.—Time to file proposed Statement of Evidence extended to and including July 21, 1930.

July 18, 1930.—Statement of Evidence filed.

October 10, 1930.—Statement of Evidence signed.

14 Supreme Court of the District of Columbia.

UNITED STATES OF AMERICA,
District of Columbia, ss:

I, Frank E. Cunningham, Clerk of the Supreme Court of the District of Columbia, hereby certify the foregoing pages numbered from 1 to 13, both inclusive, to be a true and correct transcript of the record, according to directions of counsel herein filed, copy of which is made part of this transcript, in cause No. 48467 in Equity, wherein The Titeflex Metal Hose Co. is Plaintiff and Thomas E. Robertson, Commissioner of Patents of the United States is Defendant, as the same remains upon the files and of record in said Court.

In testimony whereof, I hereunto subscribe my name and affix the seal of said Court, at the City of Washington, in said District, this 14th day of October, 1930.

[Seal Supreme Court of the District of Columbia.]

FRANK E. CUNNINGHAM,
Clerk.

15 Filed Jul. 18, 1930.

In the Supreme Court of the District of Columbia.

In Equity.

No. 48,467.

The Titeflex Metal Hose Co., Plaintiff,

v.

Thomas E. Robertson, Commissioner of Patents,
Defendant.

T. A. Hostetler, Esq., Attorney for Defendant.

Sir:

Please take notice that on —— —, ——, at the opening of the Court, or as soon thereafter as counsel can be heard, the accompanying and annexed statement of evidence, to become part of the record on the appeal in the above-entitled cause, will be submitted for his approval to the Honorable —— ——, Justice, who presided at the hearing thereof.

ROBERT WATSON,
THOMAS HOWE,
Attorneys for Plaintiff.

Service of the foregoing and of the statement of evidence therein mentioned is hereby acknowledged this 18th day of July, 1930.

T. A. HOSTETLER,
Attorney for Defendant.

Stipulation.

It is stipulated that the annexed statement of evidence is a true and correct statement in substance of all the evidence offered on the hearing of the above-entitled cause.

ROBERT WATSON,
Attorney for Plaintiff.
T. A. HOSTETLER,
Attorney for Defendant.

16 In the Supreme Court of the District of Columbia.

In Equity.

No. 48,467.

THE TITEFLEX METAL HOSE CO., Plaintiff,
v.
THOMAS E. ROBERTSON, Commissioner of Patents,
Defendant.

Statement of Evidence.

On the hearing of this cause evidence in behalf of the respective parties, plaintiff and defendant, was offered and given as hereinafter stated, as follows:

The defendant admitted the title in the plaintiff to the invention of Louis H. Brinkman sought by the Bill of Complaint herein to be patented, and to the Brinkman application Serial Number 339,620 covering the same and all rights under it.

Plaintiff's Counsel offered in evidence the file wrapper and contents of the application in the Patent Office here involved as Plaintiff's Exhibit 1.

William H. Fulton.

William H. Fulton a witness called on behalf of the plaintiff, being duly sworn did testify as follows:

Direct examination.

By Mr. Howe:

I am William H. Fulton, age 51, residence, West Orange, N. J., Chief Engineer of the Paradon Manufacturing Com-

pany in Orange, N. J. I am a graduate engineer, Massachusetts Institute of Technology, in 1900. Since my graduation up to, say, 1921, I was test engineer and later superintendent of the factory of the Consolidated Car Heating Company of Albany, and later was connected with the de-
velopment work on internal combustion engines and
17 went to the laboratory of the Titeflex Metal Hose
Company in the spring, I think, of 1916, for a period
of five years as chief engineer and factory manager. During that period I had charge of the factory operations of the Titeflex Metal Hose Company. The Titeflex Metal Hose Corporation was the predecessor of the Titeflex Metal Hose Company. While I was employed by the Consolidated Car Heating Company I had to do with the transmission of fluids or liquids under pressure and the piping and connection thereof. I had long experience there naturally with the heating work of steam trains, both for steam heating and hot water service; all pressure work. When I went with the Titeflex Metal Hose Corporation in 1916, my first work was developing apparatus to manufacture corrugated Titeflex tubing economically, and the carrying on of tests to determine methods of manufacturing. I produce here and show to the Court, three examples of the corrugated Titeflex metal tubing, one showing the tubing in section, another a small piece and also a sample of longer length, (the three samples of the Titeflex tube were subsequently offered in evidence as Plaintiff's Exhibits 5, 6 and 7).

I have read the specification and application Serial Number 339,620, which is Plaintiff's Exhibit 1, and the samples which I have produced are represented in the drawing in this application, Titeflex corrugated tube, the inner structure. The application, plaintiff's exhibit 1, shows a corrugated tube surrounded by woven strips. I am speaking of the inner core, that is the tube without the woven strips. That is the tube that was being manufactured by the Titeflex Metal Hose Corporation when I went with them in 1916, and I had direct charge of the manufac-
ture of that tube. These tubes, such as I have pro-
18 duced, without the helical strips on the outside were
a very desirable product in regard to flexibility and
permanent tightness due to the fact that it was all-metal, without packing, and therefore did not have joints subject

to deterioration and frictional wear of the packing which has been used in previous types of tubing. The previous types of tubing were made of heavier metals and had a far less degree of flexibility and were rendered tight by packing. This packing consisted of textile fabric, asbestos cord, and in some cases rubber strands were used, which were all subject to deterioration, and if the packing became displaced, due to improper manipulation, the entire tubing was destroyed, whereas Titeflex tubing, having no packing, is not subject to that defect and has proved much more durable than the previous types of tubing. I have here a sample of the tube which I know about which was made previous to this Titeflex tubing which I show to the Court. You will notice the overlapping, and it is held together by a band of rubber under here. That is subject to bending strains, more like that (illustrating). This rubber packing, of course also, every time that the tubing was moved, was subject to wear and displacement and consequent cause of leakage. Still another form was this type, this tubing here, (producing tube) has the same objections. The motion in the hose takes place, these slight curves in the overlapping convolutions and tends to bend that way (illustrating). That results in a rather rigid product, which again depends upon its strength to resist rupture by the bending strain in the metal. Those are the principal types of metal tubing that were available prior to the development of Titeflex Metal tubing. Other forms were slightly different; these cross-sections of the strip were made
19 (producing sample) and these are representative,
all depending upon the packing for tightness.

The three samples of tube previous to the Titeflex tubing were offered in evidence as Plaintiff's Exhibits 2, 3 and 4 respectively, and the three sections of the Titeflex tube previously produced by the witness were offered in evidence as Plaintiff's Exhibits 5, 6 and 7.

The Titeflex tubing (as shown by the Exhibits 5, 6 and 7 produced) were not found to be successful under all conditions of operation. Where there was not excessive pressure, but more or less high pressure, the Titeflex tube was subject to distortion by any tension between the adjacent convolutions, or the walls of the single convolutions, expanding the tube lengthwise; this naturally is not a desirable quality, and, further, such an action had a tendency to twist the hose during the process of elongation and would tend to open what we want to have a fixed joint and result in the eventual failure of the tubing. Also by the handling of the tubing, or in its connection with a surface where motion is required, the twisting action brought on the hose would again cause this same slipping in the joint. There was a resulting failure. This Titeflex tubing that I started in with when I first went with the Titeflex Metal Hose Corporation in 1916, as shown in these plaintiff's Exhibits 5, 6 and 7, was vulnerable to a twisting action in that it would create sliding in the joint, and also because the pressure of the fluid on the inside of the corrugation tends to spread and thereby lengthen the tube and cause a slipping action. Steps were taken in the factory of the Titeflex Metal Hose Company to make a tube which would have the benefits of this first tube that I built with the Titeflex Corporation but which would be free from the disadvantages that tube had that I have stated. As I recall it, various methods were attempted. One was to provide slight indentations around the circumference of the joint or seam on the outer rim of the convolutions, hoping to develop sufficient friction at that point to prevent slipping of the joint. They succeeded in putting indentations in, but if this process was carried to a sufficient degree to insure non-slipping of the joints, it developed distortion of the joint, the process of putting the dents in caused leakage between the dents. We tried soldering the entire job, but that proved rather unsatisfactory; it was impossible to tell whether the solder entered the joint to cover the surface; if it did not get into the joint it did not provide means for locking the joint on itself and prevent slipping, it being difficult to cause the solder to flow into the tight seams. We tried heavier material, to give sufficient strength to the product to prevent the slipping. That offered some improvement, but it was not an absolute preventative of the difficulty and at the same time introduced a very much stiffer material and lost a large degree of flexibility of the product, so that was not desirable. We tried other things, I do not recall them just at the moment. The final solution was submitted by Mr. Brinkman, who recommended

that the tube be wound in opposite directions with a spiral covering against the outer circumference of the tube so as to prevent the twisting, and, at the same time, prevent the elongations, this spiral covering being supported by the convolutions of the tube and fastened at the ends to couplings, and that was the final method tried, though there was some considerable discussion whether it would be effective or not when finally tried. This spiral strip was put on the outside of the tube and fastened to the couplings at the end
of the tube. That is a very essential part of it.
21 There must be couplings fastened there, fastened to
the couplings at the same time as to the tube, or if fastened to the tube without being fastened to the coupling it developed strains in the tube between the fastening and the coupling; if not fastened at all it would not do anything. It would be absolutely ineffective unless fastened to the coupling.

It was essential that the spiral strip should be tight against the tube; otherwise the twisting of the tube could start before the spiral became effective to prevent twisting, and it was essential that that action should not even start; otherwise it developed leaks in the joints in the tube; so in order to prevent the starting the spiral bands had to be laid directly on the tube and were tight against the tube, supported by the tube. Unless the spiral strips were down tight on the tube they would permit some slight movement before they took up against the tube or came down on the tube, and that would permit sliding in the tube joint, and it was essential that not even the slightest slipping in the joint should occur but that it should stay where it was originally placed because if you broke the fixedness of the joint, that started the loosening and started the leaking. The eventual result of that would depend on the service. If on a high-pressure job it would fail; in other words, start to leak, and that would have to be replaced. If on a light service, where you could tolerate some slight leakage, it might still go on in service until continued motion would enlarge the leak, because once the joint had slipped and the metal parts were not tight together, once any motion was allowed to take place at any particular point, why that would develop and increase and result in the ultimate destruction of the whole.

22 When Mr. Brinkman proposed to relieve against the disadvantages of this corrugated tube, (without the strips on it as it was first made by the Titeflex Metal Hose Corporation) by putting the helical strips on it, I did not at first think it would work. I had seen several coverings on other types of hose which always developed an extreme stiffness of the hose. I did not realize the condition would be so different in Titeflex; I thought that would be a criticism; also that other types of hose were necessarily made of much heavier material because the strength depends on the bending strength in the overlapped joint, whereas in Titeflex it is absolutely necessary to use light material. I thought the walls of the tube would not be sufficiently strong to resist internal pressures. In other words, the tensile strength of the walls seemed so extremely light that I thought the outer casing or the spiral band would not receive sufficient support from the Titeflex tubes to prevent them from reducing the diameter when the twisting strain came on the structure and that the tube would crush and allow twisting, and the whole thing would be worse than ever. But it developed that that was not true, despite the fact we were using metal only five-thousandths of an inch in thickness. Due to the structure of the tube, the sides of the convolutions were practically in a radial position in relation to the length of the hose so that it formed a regular arch structure, a deep cross section, and that the outer covering of spiral bands were firmly supported, in fact, the tube resisted compression completely; so it was effective in preventing torsion and preventing elongation.

I have related how the disadvantages of the Titeflex tube as it was made when I first went with the Titeflex
23 Corporation were removed by putting the helically wound strip on the outside, or a number of helical strips interwoven, and secured to the couplings at the end of the tube. I now produce examples of such a tube with the strip on it as made by the Titeflex Company. These samples represent the structure containing the Titeflex tube. The larger sample contains a tube with a structure similar to the small section sample, Exhibit 6. This other

sample tube structure is the same size as shown in Exhibit 5. These samples have the couplings connected together with the outer spiral covering and show a firm, fluid-tight connection with the tube, resulting in a structure that prevents twisting and prevents elongation. The strips which are helically wound and form the outer covering on the tube that I have just produced are made of either flat metal strips or groups of small metal wires or bands. It was always made that way; no fabric structure would have sufficient mechanical strength to be effective for that purpose.

The two specimens of strip-covered tube just produced by the witness are offered in evidence respectively as Plaintiff's Exhibit 8 and Plaintiff's Exhibit 9.

I have referred in my testimony to the fear that the application of these helical strips to the tube that the Titeflex Company was manufacturing would collapse the tube. I will now explain more in detail how that collapsing force would be exerted on the tube. A group of spirally wound elements, as represented in these exhibits (Plaintiff's Exhibits 8 and 9) if it is elongated by end pull, must reduce the diameter of the structure. And so the tendency to reduce the diameter in order to resist elongation must be opposed by a structure sufficiently strong to maintain the original diameter, and I felt that this tube with very thin metal walls would not be sufficiently strong to resist the
24 strain. But, as I think I mentioned before, we found that it was; that due to the fact that the thin metal in the Titeflex tube was so disposed as to form a support to the whole structure, the walls of the convolutions being placed radially in just the proper position to support this crushing strain, and with the spiral wires originally formed close to the tube, bearing on the convolutions, the tube supported the wire structure in such a way that you could not reduce the diameter. Therefore it could not elongate, and at the same time it could not twist, because a twisting strain on the outer spiral covering must also tend to reduce the diameter of the wire spirals; but this tendency to reduce the diameter was opposed by the supporting tube structure. Any attempt at elongation of the tube would cause a lessening in diameter of the helical strips, and the pressure that was thereby caused on the tube I believed would be so great that with the thin walls

of the tube that were necessary for flexibility I thought it would not be strong enough to withstand that radial strain. Also in twisting there would be a lessening of the diameter of the tubular structure formed by the helical strips, and that also had to be resisted by the corrugated tube on the inside, and I feared that it would not resist that strain successfully, but when I tried it out I found that it would. It resisted the tendency to decrease in diameter. The tube structure prevented a reduction in diameter of the wire structure on the outside. Therefore the entire unit was prevented from twisting or from elongation. The result was that the corrugated tube on the inside and the helical strip-formed covering on the outside cooperated in this way; that you had to twist that covering and cause it to decrease in diameter in order to permit the tube to have any twisting movement or sliding in the joint or elongation: and on the other hand the tube reacted against the helically formed covering so as to prevent it from reducing in diameter so that you could not reduce it in diameter and therefore there could be no twisting or elongation or stretching of the tube. The covering prevented the twisting or stretching of the tube and therefore prevented the destruction of the tube by slipping in the joint and maintained the flexibility of it besides.

Cross-examination.

By Mr. Hostetler:

These tubes are largely used for conducting oil and gasoline. In some cases they use them for relatively low-pressure steam. By that I mean, around one hundred pounds, where rubber hose would be deteriorated. They are using them for relatively high temperatures encountered in oil-burning apparatus. The use that I spoke of first in regard to oil and gasoline in the automotive field is the principal use. They have not been used for train piping and connections to conduct steam for heat and air for braking purposes. I don't know of any flexible hose that can compete with rubber hose for that purpose. A tube of that sort is subject to very rough handling. This hose can stand the twisting, but in railroad practice they pull the trains apart, and you get very abrupt bends at the fittings that no metal hose, so far as I know, has been able to withstand successfully. The so-called interlocked type of flexible tubes, such as those Exhibits 2, 3 and 4 of the Plaintiff were known before Brinkman came into the field.

26 As to Plaintiff's Exhibits 2, 3 and 4, some of them the Titeflex Company made, some were purchased in the market. The Titeflex Company made the one that you have in your hand. I think the others are commercial parts. That one there (indicating) is very likely of Titeflex manufacture. We made such hose at the time I was connected with the Company. The Titeflex Company made that particular sample (indicating). That kind of hose had been made by Titeflex. I do not know that they made that particular one.

Redirect examination.

By Mr. Howe:

The tube like Plaintiff's Exhibits 8 and 9 has found a large market especially in automotive work in conducting the oil to the various parts of the engines for lubrication where it has to stand vibration and yet be readily flexible to make ready installation. It is also used in the gasoline lines to take the place of the copper tubing, that does not withstand successfully the vibration, especially on truck work. The covered tube that has the helical strands around it, like Exhibits 8 and 9 has almost superseded the manufacture of the uncovered tube like Plaintiff's Exhibits 5, 6 and 7. I know that the tube like Plaintiff's Exhibits 8 and 9 is now in very wide commercial use. The hose, Plaintiff's Exhibits 8 and 9, is in exact accordance with the structure as described in the Brinkman application Serial No. 339,620, Plaintiff's Exhibit No. 1.

R. Harry Stone.

R. Harry Stone, a witness called in behalf of plaintiff, testified as follows:

Direct examination.

By Mr. Howe:

27 I reside at Irvington, New Jersey, and am 56 years of age. My business address is Newark, care of the

Titeflex Metal Hose Company. I am Vice President and General Manager of the Titeflex Metal Hose Company, and have been with that concern since the fall of 1917. I am familiar with the hose or tube manufactured by the Titeflex Metal Hose Company and recognize the Plaintiff's Exhibit No. 5 as the same article as manufactured by the Titeflex Metal Hose Company and also recognize Plaintiff's Exhibits 8 and 9 as being samples of hose manufactured by the Titeflex Metal Hose Company. I have examined the records of the Company to determine the business done in the hose as manufactured by the Titeflex Metal Hose Company and its predecessor, the Titeflex Metal Hose Corporation. The amount of business done by the Titeflex Metal Hose Company and its predecessor the Titeflex Metal Hose Corporation in tube the same as Plaintiff's Exhibit 5 is about one hundred thousand feet. The business done by the Titeflex Metal Hose Company and the Titeflex Metal Hose Corporation in tubing as shown in Plaintiff's Exhibits 8 and 9 is about four million feet, and its value is about a million and a half dollars. The period over which this business has extended was from 1917 to 1928 inclusive. I have not included in this statement the tubing manufactured during the year 1929, but it was practically the same as in 1928, being about 928,000 feet of hose and amounted to probably $360,000. The percentage of business done by the Titeflex Metal Hose Company and its predecessor the Titeflex Metal Hose Corporation in hose as shown in Plaintiff's Exhibit No. 5 was, after 1917 and 1918. I would say, less than one per cent., so that since 1917 and 1918 helically stranded covered hose like Plaintiff's Exhibits 8 and 9 has represented 98 or 99 per cent. of the business of my company, and has become our standard form of flexible
28 hose. In 1917 and 1918 we put out about a hundred thousand feet of hose like Plaintiff's Exhibit 5, that is, without the helically stranded covering. That was used for voice tubes on submarine chasers and destroyers. Since that time we have done about one per cent. of the whole in that line; not to exceed one per cent., so that the amount of tubing like Plaintiff's Exhibit 5 that we have put out since 1917 and 1918 is practically negligible.

In 1929 we put out about the same amount of hose like Plaintiff's Exhibits 8 and 9 as we did in 1928, and I should say that we put out about 200,000 feet more in 1928 than we did in 1927. This year has not gone very far but I should say that it continues about the same. The hose like Plaintiff's Exhibit 5, without the helically stranded covering, has been practically superseded by hose like Plaintiff's Exhibits 8 and 9.

Defendant's Answering Proofs.

Copies of the patents to Rudolph No. 1,054,244; Kelso et al. No. 606,557, Brinkman No. 1,198,392 and Witzenmann No. 933,516 were collectively offered in evidence on behalf of the defendant as Exhibit D-1. Also defendant's counsel offered in evidence the decision of the Primary Examiner of the Patent Office in the Brinkman application involved as Defendant's Exhibit D-2, and the decision of the Board of Appeals of the Patent Office in the said application as Defendant's Exhibit D-3.

Plaintiff's Rebuttal.

William H. Fulton.

William H. Fulton was recalled as a witness on behalf of the Plaintiff in rebuttal and having been previously sworn testified further as follows:

29 Direct examination.

By Mr. Howe:

I have read the patent No. 1,198,392 to Brinkman and the tube shown therein is the same as Plaintiff's Exhibits 5, 6 and 7.

I have read the patent No. 933,516 to Witzenmann. The tubing shown in this patent is the conventional type of interlocked tube. It is necessarily formed of heavy metal. The spiral covering to which he refers is not arranged to take end strains. It apparently is not even fastened to the coupling. The end strain is taken up by internal tension members, in the form of a rope or cord. Such a structure would not be at all serviceable in relation to a tube designed for service the same as the Titeflex tubing is. This heavy metal tubing would naturally support the braid, but the braid in this instance is not called upon to solve the problem that we solved in the Titeflex structure. I don't see any mention that it is designed to resist twisting. That probably did not enter into this device because the interlocked tubing is supposed to slip in the joints, and it would be rigid if it did not. Therefore there is no particular purpose served by this braid. It does not mention that as having entered into the structure to solve any particular problem. It appears to be more or less of a picture than it does any actual construction. I don't see that it says that it has a metal covering. Very likely in the particular service that this equipment was designed to take care of, they only wanted to keep the dust and grit from the railroad service out of the sliding joint. I should imagine that was more of a fabric covering than a metal jacket to resist any strains involved in the structure. I am referring to the patent No. 933,516. In that service there would be a condition where dust and grit from the roadbed would enter into the grooves, the circular grooves, in the structure, and would cause serious wear; and I suspect that that covering was largely to prevent that. I refer to the covering as shown in the drawing of the patent. That is about the only thing you can go by. I do not see any text that would indicate that it might be interpreted as metal covering, but inasmuch as it does not touch the coupling and the internal strains are taken up by the strand, it is obvious that it is not covered by metal. I should think that they had only a fabric covering to protect it from grit.

Interlocked hose is just the conventional name for a hose of this structure (indicating). This, of course, is called "full interlocked". This (indicating) is a sample of what they call "semi-interlocked", because it does not pull back on itself. We make a very careful distinction between interlocked hose as known in the trade and that shown in that type there. In fact the first one I saw was in 1900.

In the Witzenmann patent the inside metal tube "b" is not a corrugated tube depending upon bending in the corrugations to give flexibility, like the Titeflex tube, but is a non-corrugated tube, which depends for its flexibility upon sliding in the joints, like the Plaintiff's Exhibits 2, 3 and 4. None of the problems presented by the Titeflex tube, like the sliding of the joints under torsion or elongation of that metal tube nor any of those conditions, are present

in connection with the metal tube shown in the Witzenmann patent No. 933,516. The tube of the Witzenmann patent is designed to move in the joints; and it can withstand torsion, not to utter destruction, but to bending back on itself. It can take up any variation in the convolutions during the time such motion takes place, whereas in the Titeflex structure, the motion taking place in the sides of the con-
31 volutions, the twisting must be absolutely prevented from even starting.

I have looked for any statement in the Witzenmann patent No. 933,516 as to what the outside covering "h" is made of. It says "The hose section may be protected". That perhaps covers my construction of it, that it was only on there for protection from grit in this particular service. It says, "It can be protected by a plaited or like covering." That would absolutely be a fabric covering such as canvas or the like. I do not find any statements in the patent that the covering is of metal. I see no other reference to that covering there. It is not referred to in the short description in Fig. 3. I do not find any statement that the outer covering "h" is secured to the coupling and the illustration does not show it. It is absolutely necessary in order for the helically stranded outer covering to accomplish its functions in Exhibits Nos. 8 and 9 that the strands or covering should be secured to the coupling.

In this Witzenmann patent No. 933,516 if the covering "h" was secured to the coupling it would prevent elongation if the covering were metal braid or even fabric braid, but this braid obviously did not prevent elongation, because there is provided an entirely separate and rather complicated means to prevent elongation by means of an internal structure. This internal structure which I refer to is a flexible wire drawn in between the fastening and the couplings, allowing flexibility through the length of the hose but preventing destruction of the hose and change in length. That would be "d" in Fig. 2, which is attached to an eyelet number "g" by means of a disk "f", allowing a port through the coupling and at the same time fastening one coupling to the other through the hose. The wire "d" is put in there for the purpose of preventing elonga-
32 tion and the patent says nothing about any connecting of the covering "h" and it would be unnecessary.

I have read the patent No. 606,557 to Kelso et al. This makes use of spirally wound plaited covering in connection with a rubber hose.

Now, disregarding this business of covering ropes, because that probably does not enter into this discussion and is of very problem*m*atical value anyhow; the sheathing in this particular case is supported by the rubber hose, but it does not in any way prevent twisting. It was not installed to prevent twisting, because rubber hose is not injured by ordinary twisting that occurs in handling. One of the major problems that they are seeking to solve is to keep the hose from blowing out of the couplings. They did that by having this sheathing bound firmly to the coupling. It also serves the purpose of protecting the rubber pipes. That was largely used in quarries to prevent the cutting of the outer covering and damaging the hose by moisture getting into the fabric plies. In handling this hose, it could elongate to the extent that the rubber would collapse under the pressure exerted by the outer covering. In other words, there is no rigid structure necessary. There was no structure necessary to prevent twisting; and by simply observing that, it would not naturally jump from that to the structure where twisting can be prevented or elongation be prevented. I knew of the construction of such hose or tubing as shown in the patent No. 606,557 at the time we were seeking for a solution of the problem of removing the defects of the tube as first built by the Titeflex Metal Hose Corporation. I have actually seen this hose. I have
33 seen it used, what I might call a wire hose. I have
seen it used as steam hose, especially where carrying relatively high pressures and the hose was subject to the deterioration due to the high temperatures involved. Such hose frequently becomes brittle and is subject to sudden rupture due to pressure, which might cause serious accidents. The metal covering on the outside of that, which was not subject to deterioration due to temperature, would largely obviate the danger of a large break occurring suddenly. There would be a warning so that the steam could be turned off or they could get out of the way. So that was one of the large uses of that structure. In those days they didn't know how to make as good rubber hose as they do now. That was also used largely for air hose for pumping up automobile tires. When I speak of

"those days", I mean the period of 1916 to 1918, when I have seen this hose in operation. This small air hose was generally made with finer braid incidentally this particular product, as I recall it, was made by a concern in Philadelphia, and the large market is steam hose, which, as I say, has for its purpose to prevent accidents due to sudden failure of the hose due to becoming deteriorated by the high temperature involved. This is no object in preventing twisting of the hose shown in patent 606,557. The braid did not prevent the twisting of the hose structure because the hose would not support the braid. There was no occasion to prevent twisting of this hose because it stands twisting, and is not hurt by it, and the structure of the patent No. 606,557 would not prevent twisting because any strain that would start twisting through the covering would simply collapse the tube and allow it to twist as the rubber hose did not oppose a stiff resistance to the reduction in diameter of the braid.

I have read the patent No. 1,054,244 to Rudolph. This again is an interlocked type of hose and is not damaged by twisting which comes from elongation and therefore that problem did not enter into it. The hose itself, the tube, is necessarily made of heavy metal, and therefore there would be no question about the tube supporting the outer covering. The language is rather loose. It does not appear to mention all the problems of the tubing. It speaks of the covering, that the sheathing can no longer slip out of the coupling, but is forced to follow the pipe in its elongations and contractions. In other words, with this type of tube it is not necessary to allow the tube to elongate and contract. In other words there is no flexion in it. That being the case, it would appear that the sheathing as he describes it, could not be put on that pipe. It could not be tight at all in that position and be supported by the tube, and therefore it acts in an entirely different way as when mounted on the Titeflex structure. 34

All this gets back to the point that different problems are involved in protecting the Titeflex tube than there were in protecting the interlocked tube. In the latter the twisting was not fatal to its pressure-withstanding qualities; and it must necessarily elongate in order to flex at all; whereas in the Titeflex any twisting would be fatal. The protecting sheathing and cover have to be mounted so as to absolutely prevent even a start or a tendency to twist or to elongate, which would amount to the same thing. That structure depends for its flexibility on the movement of the side walls of the convolutions.

Where I have stated that the tube of the Rudolph patent slides in the joint to flex, I am referring to the tubing indicated in the patent by the reference number "1", particularly in Fig. 1. The tube 1 of the Rudolph patent and the inner tube "b" of the Witzenmann patent are all sliding joint tubes. But in the particular form shown in Rudolph patent the profile indicates that to be what is called a high ridge tube. It differs from the tube of the Witzenmann patent in that it has a different form of profile of the strip and the means of holding the asbestos packing that is used in a job of that sort. The tube 1 of the Rudolph patent, the tube "b" of the Witzenmann patent and the tubes Plaintiff's Exhibits Nos. 2, 3 and 4 are all sliding joint tubes with packing. No problem of prevention of torsion enters into that class of tubes at all.

None of the patents, namely No. 1,054,244, No. 606,557; No. 933,516, No. 1,198,392 show any disclosure of a spirally wound strand on the Titeflex nor do they show any way of accomplishing the same results nor do they show the same cooperation of the tube with the helically wound strip covering.

Cross-examination.

By Mr. Hostetler:

My reason for saying that the device shown in the Rudolph patent is made of heavy metal is simply my experience in manufacturing such a type of tube. If I see a cross section of the form of that tube, as indicated by the outside that they give, as a matter of fact, that tube is always from five to ten thousandths heavier metal and that type of tube has a higher ridge than is needed on a full interlocked, because the edge of the metal does not fold back and form a hooked joint; it simply is a little ridge sticking up, and the other edge laps over. Consequently, it requires a considerably heavier metal to withstand the bending strain that takes place. In bending, the metal

slides when you go that far. If you keep within the sliding range the clearances that are provided in the joint, the
metal does not get the strain. As soon as the pack-
36 ing stops against one side, and the other side comes
against it, then you develop a bending strain in those
ridges; and that takes place, of course, in handling. So the strain does go back, incidentally, that is, the bending to the point of taking the set. My basis for the statement that the movement takes place, the sliding in the joint, notwithstanding I notice that the specifications say "interlocked," and that it is not interlocked so tight that there is no sliding in the joints, is that although we sometimes get that when we are making it, because we do not equalize it, it makes the tube so stiff that you cannot bend it. Then it is not flexible hose any more. The whole structure of the thing, the whole theory is that the, speaking now of tubes to withstand pressure, of the interlocked type, is that the outside layer of metal comes against the packing which in turn comes against one layer of the adjacent turn. Necessarily to get any motion between the adjacent turns, it must slide on that packing.

In the Brinkman patent No. 1,198,392 in Fig. 7 I note the central portion marked "59" on sheet 3, and the corrugations marked "53" seem to be very far apart, while the metal to the left, where marked "96," they are tight together. I explain this by stating that this cross-sectioned portion around the tube, numbered "53," represents the form of die that the tube is formed in. We call that an open tube. Entering the die at the right hand side of the page as you look at it, there is no metal shown for the very first turn or two. Then a single strip comes in, having been drawn through a form and die to profile it, as we call it, into the form which you see in the first section which shows in the grooves in the die. That comes around and
it comes into the turn that was just coming in and
37 forms the start of the interlocked joint. It proceeds
through the die and comes out in the spacing accord-
ing to the pitch that is formed in the die. The final operation, after it leaves the machine is that it is closed, compressed together, on a rod and takes form as you see it, of corrugations close together, the purpose being to provide a section so as to distribute the strain over a large number

of convolutions in bending at any definite angle. As they leave the die the convolutions take the position that you see in this sample.

Redirect examination.

By Mr. Howe:

In the Brinkman patent No. 1,198,392 the metal portion "59" shows the tube as it comes out of the die, the same pitch as the die. In order to cause more corrugations to the unit of length and thereby increase its flexibility by producing more corrugations in the unit of length, the tube as shown at "59" is squeezed or pressed together lengthwise. This forms the tube with the corrugations closer together as shown at the left hand of Fig. 7 of the patent.

Recross-examination.

By Mr. Hostetler:

In bending the Brinkman tube you can go too far, naturally, with an unprotected tube, and under such circumstances corrugations down below are pressed together but those above on the circumference would expand. That is what takes place with the bends in the sides of those convolutions. When pressed like that (indicating) you get that expansion in those radial walls. Also the lower corrugations would press together tighter, the upper
38 would spread apart, but the joint remains fixed at the seams, at the outside edge of the convolutions.

Service of the foregoing condensed statement of evidence is hereby acknowledged this 18th day of July, 1930.

T. A. HOSTETLER,
Solicitor for Defendant.

The foregoing is a true and correct statement in substance of all the evidence offered on the hearing of the above-entitled cause on behalf of the parties plaintiff and defendant as offered, given and received in open Court, and the same is accordingly approved as such to become and be part of the record on the appeal in the said cause, according to the provisions of the rule of Court in such case made and provided, this 10th day of Oct., 1930.

WENDELL P. STAFFORD,
Justice.

39 PL'FS EXHIBIT NO. 1.

In the Supreme Court of the District of Columbia.

Equity. No. 48,467.

TITEFLEX

v.

ROBERTSON, Commissioner of Patents.

390.

Department of Commerce, United States Patent Office.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the records of the office of the File Wrapper, Contents and Drawing, in the matter of the Abandoned Application of Louis H. Brinkman, filed November 21, 1919, Serial Number 339,620, for Improvement in Tube.

In testimony whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed, at the City of Washington, this seventh day of October, in the year of our Lord one thousand nine hundred and thirty, and of the Independence of the United States of America the one hundred and fifty-fifth.

[Seal Patent Office, United States of America.]

THOMAS E. ROBERTSON,
Commissioner of Patents.

Attest:
D. E. WILSON,
Chief of Division.

40 Special.

(Ex'r's Book) 186/ 1855/8.

Number (Series of 1915), 339620.

[1918]* 1919.

Div. 39.

Patent No. —.

Name: Louis H. Brinkman, Ass'or by mesne assigts. to Titeflex Metal Hose [Corporation]* Co., a corp. of New [York]* Jersey, of Glenridge, County of ——, State of New Jersey.

Invention: Tube.

		Original	Renewed
Parts of Application Filed.	Petition,	Nov. 21, 1919	——— —, 191-.
	Affidavit,	" ", 1919	——— —, 191-.
	Specification,	" ", 1919	——— —, 191-.
	Drawing,	" ", 1919	——— —, 191-.
	Photo Copy,	——, —, 191-	——— —, 191-.
	First Fee Cash, $15,	Nov. 21, 1919	——— —, 191-.
	" " Cert.,	——, —, 191-	——— —, 191-.
	Appl. filed complete,	Nov. 21, 1919	——— —, 191-.

Examined and Passed for Issue ——— —, 191- ——— —. 191-.

——— ———, Exr. Div. — ——— ———, Exr. Div. —.

Notice of Allowance, ——, —, 191- ——— —, 191-.

By Commissioner. By Commissioner.

Final Fee Cash, —, ——— —, 191- ——— —, 191-.

" " Cert., —, ——— —, 191- ——— —, 191-.

Patented: ——— —, 191-

Attorney: Thomas Howe, [#2 Rector St.,]* 74 Trinity Place, New York, N. Y.

Associate Attorney: ——— ———.

(No. of Claims Allowed —.) Print Claims — in O. G. (Cl. —.)

Title as Allowed: ——.

[*Words and figures enclosed in brackets erased in copy.]

41 Serial No. 339,620. Paper No. 1

Application.

Petition.

To the Honorable the Commissioner of Patents:

Your petitioner Louis H. Brinkman, residence: Glenridge, County of Essex and State of New Jersey, post-office address: 248 Ridgewood Avenue, Glenridge, County of Essex and State of New Jersey, respectfully prays that Letters Patent of the United States of America may be granted to him for the improvements in tube set forth in the annexed specification, and he hereby appoints Thomas Howe, registered No. 7450, of 2 Rector Street, in the Borough of Manhattan, City of New York, his attorney with full powers of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to sign the drawings, to receive the patent, and to transact all business in the Patent Office, connected therewith.

[Documentary stamp.]

LOUIS H. BRINKMAN.

Specification.

To all whom it may concern:

Be it known that I, Louis H. Brinkman, a citizen of the United States of America, residing at Glenridge, County of Essex and State of New Jersey, have invented new and useful improvements in tube of which the following is a specification:

42 This invention relates to tubes.

The present application is a division of the prior application Serial Number 119,426 filed September 11th, 1916. Pat. 1,340,818, May 18, 1920.

Where a corrugated tube is subjected to longitudinal pull the corrugations may be so expanded or spread as to do injury to the tube by giving the metal a permanent set or otherwise. To guard against this it is one object of the invention to provide a strand helically wound about the corrugated tube and having its ends secured to the ends of the tube. Any tendency of the tube then to elongate will also tend to elongate the helical strand which will tend to reduce the diameter of the helix so that elongation will be resisted by the coming of the strand against the corrugations. The radial sides of the corrugations form webs against which the strand tends to bear edgewise, so that it is strong in resistance to the reduction of diameter of the helix tending to be caused by any attempted elongation. The corrugated tube with the helical strand as described therefore, forms an extremely strong structure.

A further object of the invention is to provide a tube formed of a helically disposed strip with the edges of adjacent convolutions secured together, with a strand helically wound about the tube and secured to the tube at its ends. The tube formed of a strip as described, is peculiarly vulernable to a twisting action. The helical strand will oppose the twisting of the tube in one direction and when suitably disposed on the tube may furnish all the protection against twisting which is desired. By providing two strands helically wound in opposite directions about the tube and secured to the tube at its ends, twisting of the tube in either direction may be prevented.

43 It is therefore a further object of the invention to provide a tube formed of a helically disposed strip having the edges of adjacent convolutions secured together with strips helically wound about the tube in opposite directions and secured to the tube at its ends.

In that class of corrugated tubes which are formed of a helically disposed strip having a central longitudinal groove forming the corrugation, a strand helically wound about the tube and secured to the tube at its ends, furnishes a strong structure against elongation and also guards against twisting as above set forth, while such a tube with oppositely wound helical strands thereon will provide a strong structure against elongating forces and afford protection against twisting in either direction.

A further object of the invention may therefore be said to be the provision of a corrugated tube formed of a helically disposed strip having a central longitudinal groove for forming the corrugations, the edges of adjacent convolutions being secured together and a strand helically wound about the tube and secured to the tube at its ends.

While a still further object of the invention may be said to be the provision of a structure comprising a corrugated tube formed from a helically disposed strip with a central longitudinal groove, the edges of adjacent convolutions being secured together and strands helically wound about the tube in opposite directions and secured to the tube at its ends.

Other and ancillary objects of the invention will appear hereinafter.

In the accompany drawings which illustrate the invention:

Fig. 1 is a view of a hose or coupling embodying
44 the invention partly in section and broken away at the
center, the corrugated tube being shown in exterior
elevation; and

Fig. 2 is a view the same as Fig. 1 except that the corrugated tube is broken away to show a partial central longitudinal section.

45 Referring to the drawings, a hose is therein shown as included in a coupling adapted for use in connecting pipes such, for instance, as air pipes on adjacent cars of a train, and for other uses. The terminals 1 and 2 of the coupling are screw-threaded as at 3 for attachment to the pipe ends. To each of the terminals is secured a corrugated flexible tube 4 by any suitable means as by screwing the end into the threads 5 in the terminal. This tube permits of flexure by relative movement of the sides of the corrugations 6 and 7. Preferably the corrugated tube is formed of a spirally wound strip or ribbon having the groove 8 formed lengthwise of the strip and adjacent edges of contiguous convolutions being interfolded as shown at 9 to form a fluid-tight joint. Preferably this joint is at the outermost portion of the wall of the tube 4. The sides 7 and 10 of the groove in the strip are also here shown as reflexed with relation to the bottom 11 of the groove and this is the preferred form, but the sides may have other angular relations.

Wound spirally around the tube in opposite directions are strands 12 and 13 having their ends secured to the terminals 1 and 2 by soldering or otherwise. These strands may be each a single strip of metal or formed of a number of threads of metal or may be of other formation.

They may be interwoven with each other as shown. This structure permits bending of the hose. When, however, there is any lengthening of the hose the stranded covering, being lengthened, is reduced in diameter. The reduction in diamter brings the covering against the inner corrugated tube so that its inward movement is limited, the inner corrugated tube being peculiarly strong to resist radial
pressure. This capacity (see page after "Claims")
46 for radial resistance is augmented by the reinforce-
ment afforded by the quadruple thickness of material at the joint where adjacent edges of the spirally wound strip are interfolded. It will be seen that the strands or strips 12 and 13 which are spirally wound around the tube in opposite directions and secured to the terminals 1 and 2, will prevent twisting of the structure. This is an important feature as the tube 4 is more likely to be injured by forces tending to twist it than by those applied in other ways.

While the invention has been illustrated in what is considered its best application it may have other embodiments without departing from its spirit and is not therefore limited to the structure shown in the drawings.

47 What I claim is:

1. The combination with a corrugated
Insert C^1. tube ∧, of a strand outside the corrugations
C^1
and bearing upon said corrugations
Per C. of said tube ∧, said strand being wound heli-
connected
Per B. cally about said tube and [secured]* ∧ to the
ends of said tube.

Canceled per C.

2. The combination with a tube formed of a helically disposed strip having the edges of adjacent convolutions engaging each other, of a strand would helically about said
connected
tube and [secured]* ∧ to said tube at its ends.

3. The combination with a tube formed of a flexible strip, said strip being helically disposed and having the edges of

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[*Words and figures enclosed in brackets erased in copy.]

adjacent convolutions secured together, of strands helically
wound about said tube in opposite directions and [se-
connected
cured]* ∧ to the ends of said tube.

[Matter enclosed between rules erased in copy.]

2. [4.]* The combination with a corrugated
Insert C^2 tube, ∧ of strands helically wound about said
C^2
bearing against said corrugations
Per C. tube in opposite directions, ∧ and [se-
connected
“ “ cured]* ∧ to the ends of said tube.

3. [5.]* The combination with a flexible
tube comprising a helically disposed strip
forming a corrugation
“ “ having a central longitudinal groove ∧ and
adjacent
having the / edges of contiguous convolutions
Insert C^3. interfolded, ∧ of strands wound helically about
C^3
bearing against said corrugations
Per C. said tube in opposite directions, ∧ and [se-
connected
cured]* ∧ to the ends of said tube.

4. [6.]* The combination with a flexible
corrugated tube formed of a helically disposed
forming a corrugation
“ “ strip having a central longitudinal groove ∧
and the adjacent edges of contiguous convolu-
said tube depending for flexibility upon rel-
ative movement of the corrugation sides,
“ “ tions interfolded, ∧ [of]* fittings secured to
said tube at its ends, and strands helically
wound about said tube in opposite direc-
bearing against said corrugations
“ “ tions ∧ and secured to said fittings.

Add (CC75) A^1 >

[*Words and figures enclosed in brackets erased in copy.]

48 In testimony whereof I have signed this specification this 20th day of November, 1919.

LOUIS H. BRINKMAN.

Oath.

STATE OF NEW YORK,
County of New York, ss:

Louis H. Brinkman, the above-named petitioner, being sworn, deposes and says that he is a citizen of the United States and resident of Glenridge, County of Essex and State of New Jersey, that he verily believes himself to be the original, first, and sole inventor of the improvements in Tube, described and claimed in the annexed specification which is a division of my application Serial Number 119,426, filed September 11th, 1916, that he does not know and does not believe that the same was ever known or used before his invention or discovery thereof, or patented or described in any printed publication in any country before his invention or discovery thereof, or more than two years prior to said application, or patented in any country foreign to the United States on an application filed more than twelve months before the aforesaid application, or in public use or on sale in the United States for more than two years prior to the first said application; and that no application for patent on said improvement has been filed by him or his representatives or assigns in any country foreign to the United States.

LOUIS H. BRINKMAN.

Sworn to and subscribed before me this 20th day of November, 1919.

[SEAL.] [Illegible]

49 U. S. Patent Office, Mar. 3, 1920. Division XXXIX.

Mail Room, Mar. 2, 1920. U. S. Patent Office.

Serial No. 339620. Paper No. 2.

Amendment A.

39.

In the United States Patent Office.

Louis H. Brinkman. Tube, F. Filed November 21, 1919.
Serial Number 339,620.

New York, New York, March 1, 1920.

Honorable Commissioner of Patents,
Washington, D. C.

SIR:

The above entitled application is hereby amended as follows:

corrugated
A^1. Per C. —5 [A]* The combination with a ∧
Insert C^4. tube ∧ formed of a helical strip having
C^4
the edges of adjacent convolutions in engagement, of means for preventing twisting of the said tube whereby tendency to cause sliding in the joint between adjacent convolutions is overcome—

Respectfully submitted,
THOMAS HOWE,
Attorney for Brinkman.

50 U. S. Patent Office, Jul. 1, 1920. Mailed.

Div. 39, Room 220.

Paper No. 3.

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

FHH/MD.

Department of the Interior, United States Patent Office, Washington.

July 1, 1920.

Thomas Howe,
2 Rector St.,
New York, N. Y.

Please find below a communication from the Examiner in charge of the application of Louis H. Brinkman, filed Nov. 21, 1919, Ser. No. 339,620. Tube.

JAMES T. NEWTON,
Commissioner of Patents.

This case has been examined.

Claims 1, 2, 3, 4 and 5 are objected to as inaccurate in reciting that the "strand" is "secured" to the ends of the tube. The description states that the strand and the tube are separately secured to the fittings.

The claims are rejected on the patent to

Brinkman, 1,198,392, Sept. 12, 1916, Class 137-75. It appears to involve no invention to fortify the tube therein in the way claimed in view of either of the patents:

Kelso, et al., 606,557, June 28, 1898, Class 137-900.
Smith, 762,954, June 21, 1904, Class 137-900.

ARTHUR W. COWLES,
Examiner.

51 U. S. Patent Office, Jul. 2, 1921, Division XXXIX.

Mail Room, U. S. Patent Office, Jul. 1, 1921.

Serial No. 339620. Paper No. 4.

Argument.

In the United States Patent Office.

Div. 39, Room 220.

Louis H. Brinkman. Tube. Filed November 21, 1919. S. N. 339,620.

New York, New York, June 30, 1921.

Honorable Commissioner of Patent,
Washington, D. C.

Sir:

Reconsideration of each and all of the claims 1 to 7 inclusive is requested.

With regard to claims 1 to 5 inclusive it may be pointed out that if the strand and the tube are secured to a fitting they are secured to each other, therefore, these claims would seem to be accurate. We are, of course, familiar with the Brinkman patent cited for the reason that Mr. Brinkman is the applicant herein and we do not understand that this patent is cited for any other purpose than to show that a corrugated tube formed of a helical strip and having the edges of adjacent convolusions secured together is old. This is no doubt the fact but we do not think that the claims read on this structure, and in fact present a combination of elements involving a conception and results which are in no wise suggested by the prior Brinkman patent. We may first point out that with the strands wound spirally around the corrugated tube as described, the structure, as a whole becomes one which is peculiarly strong and resistant to tensile stresses, which combination does not exist in any of the references cited, thus the radial ribs formed by the corrugations are strongly resistant to radial pressure. The helically stranded covering on the outside of the corrugated tube in the present case tends to reduce in diameter if

elongated. This reduction is resisted by the radial
52 corrugations of the tube as before referred to and thus we have a reaction between the corrugated tube and the stranded covering which produces together a remarkably strong structure, the tube reinforcing the covering as well as the covering reinforcing the tube in a manner not suggested by any of the references. This cooperation of the helically stranded covering and the corrugated tube as set forth beginning near the bottom of page 5 of the specification as originally filed. This argument applies to all of those claims which specify a corrugated tube, namely claims 5 and 6.

The present new combination, however, presents other aspects which are different from any considerations involved in any or all of the references and which has been set forth in the specification as originally filed herein, namely that a tube formed of a helical strip and having the edges of adjacent convolutions engaging with each other is peculiarly vulnerable to a twisting action tending to cause sliding in the joints of the tube which would result in its distortion and possible destruction. The strands wound helically about such a tube prevent such twisting action from acting upon the tube and so a permanent and durable structure is secured.

When the tube employed is other than that formed from a helical strip (and this is the case with the Kelso and Smith patents) no such consideration as has been referred to appears and in the prior Brinkman patent the tube has no covering. This argument applies to all of the claims and we submit that inasmuch as the claims present novelty and are of advantage in ways not suggested by the references cited they should be allowed.

Looked at another way, the tube of the prior Brinkman patent which forms an element of the combination
53 herein has proved extremely well adapted for use in providing a fluid-tight, flexible tube. It is vulnerable, however, in certain respects as indicated and the question presented to Mr. Brinkman, the solution of which resulted in the invention of the present case, was not one of substituting the tube of the Brinkman cited patent in structures such as Kelso and Smith (even if this could not, however, be done), but it was a question of providing a struc-

ture which could be used where stresses dangerous to the Brinkman tube existed, as in the air-coupling between the railway cars, so that the advantages of the Brinkman tube could be availed of in such locations. Accordingly Mr. Brinkman set to work to provide a structure which could be so used and in the course of his consideration and experimentation in regard to the matter he hit upon the helically stranded covering as cooperating with the structure of the Brinkman tube so as to provide a structure strongly resistant to tensile stress and at the same time to protect the tube against its peculiarly vulnerability to twist against, and at the same time permitting the tube to flex. Certainly these ideas and accomplishments are not present in any of the references.

We submit that the claims present a new combination which is unusually meritorious in its advance over the prior art, presenting, as it does, the solution in a remarkable simple structure of many difficulties as has been set forth.

Reconsideration of each and all of the claims now presented and of the application as a whole is requested. It is submitted that the application is now in condition for allowance and such action is accordingly solicited.

Respectfully submitted,

THOMAS HOWE,
Attorney for Brinkman.

54 Patent Office, Sep. 23, 1922. Mailed.

Div. 39, Room 220.

2—260.

Paper No. 5.

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

AWC-SAT.

Department of the Interior, United States Patent Office,
Washington.

Sept. 23, 1922.

Thomas Howe,
2 Rector St.,
New York, N. Y.:

Please find below a communication from the Examiner in charge of the application of Louis H. Brinkman. Filed Nov. 21, 1919. Ser. No. 339,620. Tube.

THOMAS E. ROBERTSON,
Commissioner of Patents.

Responsive to Argument filed July 1, 1921.

The objection of record as to the inaccurate "secured" is repeated. Apparently an object freely movable throughout its length relative to another object cannot be properly said to be "secured" to the latter. The word *connected* seems to be generic to direct and indirect attachment, and no objection is seen to the use of that word.

The claims are again rejected on the art of record.

The issue appears to be first, whether the helical strand covering in either the Smith or the Kelso patent performs the function as to the enclosed tube which applicant's helical armor does: i. e. prevents undue longitudinal and twisting strain of the enclosed tube: second, whether when the helical armor of Smith or Kelso is applied to the Brinkman hose the armor exhibits any property or capacity not realised by one skilled in the art, through operation of it in its known use.

There seems to be no doubt as to either condition. In the Smith or Kelso patent, the helical armor apparently operates equally as truly as in applicant's invention, to prevent the desired action of the inner tube: and apparently also when applied to the Brinkman tube, would exhibit the same qualities.

This action is not made final, because applicant or his attorney may be in a position to traverse it successfully.

ARTHUR W. COWLES,
Examiner.

56 U. S. Patent Office, Sep. 24, 1923. Division XXXIX.

Mail Room, U. S. Patent Office, Sept. 22, 1923.

In the United States Patent Office.

Div. 39, Room 220.

Application of Louis H. Brinkman. Tube. Filed November 21, 1919. Serial Number 339,620.

Honorable Commissioner of Patents,
Washington, D. C.

Sir:

The above entitled application is hereby amended as follows:

Claim 1, line 3, and in each of claims 2 to 5 inclusive, last line, change "secured" to —connected—

Remarks.

With regard to the first phase of the issue as presented by the examiner, we think that the helical strand covering of Kelso et al. and Smith prevents undue longitudinal and twisting strain of the enclosed tube. This we think must necessarily follow from the presence of the covering because that is the way such a covering functions. Also we think it may be admitted that the second phase of the issue as stated by the examiner is correct, namely that when the helical armor is applied to the Brinkman hose it exhibits no new property or capacity. But all this relates to but one element of the combination here claimed, namely the covering, and the position seems to be that there can be no invention in combining an element with another element to form a combination unless new and unexpected properties are developed in *that* element. We do not so understand the law. We understand that elements each acting *per se* in a well known manner and developing no
57 new or unexpected properties *per se*, may be combined and that if a new result is produced or an old result is accomplished in a better way, there is a patentable combination. In fact, in the great majority of patented

combinations the inventive conception resides in the relationship and co-operation of the elements and not in any new or unexpected properties of the individual elements. Wheels may act as wheels, gears may act as gears and levers may act as levers but their combination may involve a highly meritorious inventive conception.

Now, with reference to the present application, the Brinkman tube of his patent cited (another invention of this applicant) has numerous advantages as appear therein including ease of manufacture, absence of packing and thinness of material whereby the flexibility of the tube is enhanced. This tube was excellent for many purposes but it was vulnerable to undue tensile and torsional stresses. The question was how to secure a structure having the advantages of the Brinkman tube but without its vulnerability as stated. This Mr. Brinkman solved by the conception that he could relieve against the disadvantage by combining his tube with the helically stranded covering and that he could do this without using heavier material in his tube and so reducing its flexibility because, he conceived, the light material necessary to best flexibility and working could still be used as the corrugations would cause the material of the tube (the sides of the corrugations) to be presented edgewise to the force of the radial contraction of the covering occasioned by tensile stress, so that even this light material would be able to withstand the crushing effect of this radial contraction in the same manner that the thin web of an I-beam is able to resist greater deflecting forces than the same amount of material otherwise disposed; and accompanying this the structure had the property of re-
58 sisting torsional stresses and so protected the tube
against sliding in the joint as has been referred to. We submit therefore that the combination of this application involves a new and useful relationship of elements which is not apparent from the references cited. In fact it is unusually ingenious in the production of a structure overcoming numerous difficulties in a very simple and effective manner. The relationships of corrugations, joints and helical strands could not possibly be suggested by Smith or Kelso because neither has corrugations nor joints likely to be injured by sliding, and Brinkman cited has no helical strand and there is nothing in these references suggesting the conception herein as above set forth.

The claims have been amended to adopt the phraseology suggested by the examiner. They obviously, and apparently admittedly, differ from the references cited and it is submitted that they are patentable for the reasons above set forth.

Reconsideration of each and all of claims 1 to 7 inclusive and of the application as a whole is requested. It is submitted that the application is now in condition for allowance and such action is accordingly solicited.

Respectfully submitted,

THOMAS HOWE,
Attorney for Applicant.

59 Patent Office, Jan. 23, 1924. Mailed.

Div. 39, Room 220.

2—260.

Paper No. 7.

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

SS/MD.

Department of the Interior, United States Patent Office,
Washington.

Jan. 23, 1924.

Thomas Howe,
#2 Rector St.,
New York, N. Y.

Please find below a communication from the Examiner in charge of the application of Louis H. Brinkman, filed Nov. 21, 1919, Ser. No. 339,620. Tube.

THOMAS E. ROBERTSON,
Commissioner of Patents.

This is in reply to amendment filed Sept. 22, 1923.

In view of applicant's argument, a more extended search has been made in the art.

All claims are rejected on any of the following art:

Witzenmann, et al. (French), 328,650 of 1903, Class 137-75 F.
Witzenmann, 993,934, May 30, 1911, Class 137-75 F.
Greiner, 1,181,522, May 2, 1916, Class 137-75 F.
Rudolph, 1,054,244, Feb. 25, 1913, Class 285-72.

Since this application has been pending before the Office more than three years it has been made Special in accordance with Commissioner's Order No. 2210. Applicant is expected to make prompt response to the Office actions.

A. W. COWLES,
Examiner.

60 U. S. Patent Office, Jan. 26, 1925, Division XXXIX.

Mail Room, U. S. Patent Office, Jan. 23, 1925.

In the United States Patent Office.

Division 39, Room 220.

Special.

In re Application of Louis H. Brinkman. Tube. Filed November 21, 1919. Serial No. 339,620.

Hon. Commissioner of Patents,
Washington, D. C.

SIR:

The above entitled application is hereby amended as follows:

Claim 1, line 1, after "tube" insert

C^2. —depending for its flexibility on relative movement of the corrugation sides—;

line 2, after "tube" insert —and bearing upon said corrugations—

Cancel claims 2 and 3.

Claim 4, line 1 after "tube" insert

C^2. —depending for its flexibility on relative movement of the corrugation sides—;

line 2, after "directions", insert —, bearing against said corrugations—

Claim 5, line 3, after "groove" insert —forming a corrugation—; line 4, after "interfolded" insert

C³. —, said tube depending for flexibility on relative movement of the corrugation sides—;

last line, after "directions", insert —, bearing against said corrugations—.

Claim 6, line 3, after "groove" insert —forming a corrugation—; line 4, cancel "of" and after the comma insert —said tube depending for flexibility upon relative movement of the corrugation sides,—; last line, after "directions" insert —bearing against said corrugations—.

61 Claim 7, line 1, before "tube" insert —corrugated—; same line, after "tube" insert

C⁴. —depending for flexibility upon relative movement of the corrugation sides—.

Remarks.

Reconsideration of Claims 1, 4, 5, 6 and 7, as amended, is requested.

It is to be observed that none of the patents disclose a tube as now specified in each of the claims, namely a corrugated tube which depends for its flexibility upon relative movement of the corrugation sides. This makes possible the making of the joint immovable so that packing can be avoided and still the joint be tight. The tubes of the Witzenmann patents (French and United States) and also of the Greiner and Rudolph Patents, are tubes which depend for their flexibility upon sliding in the joint so that packing is required to make them tight, which is most objectionable and under some circumstances is prohibitive. Really this class of tube is not a corrugated tube at all. There is a crimp in the middle of the strip of which the tube is formed so that one side may be lower than the other, so that the edge of a convolution may fit under the adjacent edge of a neighboring convolution while the opposite edge of the strip will pass over the convolution on the other side. The sliding joint tube of these references is entirely

different in function and characteristics from the Brinkman tube forming a part of the invention here claimed. We may again point out that in order to produce the desired flexibility in this Brinkman tube with the movable joint and flexibility provided by relative movement of the corrugation sides, it must be made of thin material to provide the desired flexibility and it is peculiarly vulnerable to
62 a twisting action which will destroy the tightness of the joint.

Obviously this consideration can have no application to the tubes of the cited patents, because their joints are loose and no particular harm is done if they do slide and the material may be thick.

Furthermore, the present invention involves the idea that although the tube corrugations are thin for reasons as stated, they are edgewise of great strength like the web of an I-beam so that when the helical braid or covering is applied to the outside, tensile strains upon the hose so equipped will cause a reduction in diameter of the braided covering which will be resisted by the edgewise action of the corrugation sides. Also, the helical disposition of the braided strands, and in opposite directions, prevents damage from twisting forces as above referred to.

To put the matter briefly, the Brinkman tube here involved possesses characteristics and features which had to be relieved against, which are entirely lacking in the tubes of the patents cited so that there could be no conception in regard to the latter of the combination here involved. The combination here claimed involves a consideration of the disposition of parts and reaction of parts whereby a hose is provided having the desired characteristics of the Brinkman tube; namely, flexibility and tightness without movement in the joints, but which hose, with the helical covering as here claimed, is relieved of certain weaknesses making a strong and reliable structure with the desired characteristics; whereas the previous structure had been unreliable in some respects.

63 Also, the above argument applies to each one of the claims which has now been amended to include the corrugated tube with the fixed joint depending for flexibility upon relative movement of the corrugation sides and

it is submitted that each one of them is thus differentiated over the references and is allowable.

Also the claims have been amended, as will be noted, to specify that the helical strands bear against the corrugations. This is not true of the Greiner patent, as his strands bear against a helical edgewise wound strip. Also as to the Witzenmann patents it does not clearly appear that the helical covering is attached either to the couplings or the enclosed tube which is necessary in order to relieve against injury from twisting. In fact, it would seem particularly from the Witzenmann United States Patent that the braided covering is not so connected as other means is provided for taking up tensile stresses, which would not be necessary if the covering were attached to the couplings. The braided covering is referred to as simply a covering or armour and in such case would not meet the claims or accomplish applicant's function even it it were applied to a tube as specified in the claims, which is not the case, as above pointed out.

As to the Rudolph Patent—this has not the tube of the claims as amended and has not a combination which could perform the functions of applicant's claimed combination.

Reconsideration of each and all of the claims now presented and of the application as a whole is requested and it is believed that the application is now in condition for allowance and such action is accordingly solicited.

Respectfully submitted,

THOMAS HOWE,
Attorney for Applicant.

64 Patent Office Jan. 28, 1925. Mailed.

Div. 39, Room 220.

2—260.

Paper No. 9

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

SS:LW.

Department of the Interior, United States Patent Office,
Washington.

January 28, 1925.

Thomas Howe,
2 Rector Street,
New York, N. Y.

Please find below a communication from the Examiner in charge of the application of Louis H. Brinkman, Ser. No. 339,620, filed Nov. 21, 1919, Tube.

THOMAS E. ROBERTSON,
Commissioner of Patents.

Responsive to amendment filed Jan. 23, 1925.

Applicant's argument has been carefully considered but it is not seen wherein applicant has accomplished anything over Rudolph of record. Rudolph clearly states in lines 55 to 57 that "the flexible pipe is formed by a suitably shaped helically wound strip of metal the edges of which interlock," which language clearly includes pipe similar to that of Brinkman of record. There does not appear to be any invention in forming a metallic plait or braid on the Brinkman pipe in view of the Rudolph patent of record.

The claims are, therefore, rejected on Brinkman of record, in view of Rudolph of record, for the reason stated.

Applicant may also see the patent to:

Witzenmann, 933,516, Sept. 7, 1909, 137-75 F.

This application has now been pending before the Office for more than *five* years. Applicant is, therefore, expected to make a more prompt response to the Office actions than heretofore.

FRED KEPLINGER,
Act. Examiner.

65 U. S.Patent Office, Jan. 29, 1926. Division XXXIX.

Mail Room, U. S. Patent Office. Jan. 28, 1926.

In the United States Patent Office.

Div. 39, Room 220.

Application of Louis H. Brinkman. Tube. Filed November 21, 1919. Serial Number 339,620.

Honorable Commissioner of Patents,
Washington, D. C.

Sir:

Reconsideration of the claims is requested.

We have carefully considered this matter in the light of the last rejection and are firmly of the opinion that the claims are patentable. We do not attach importance to the statement of Rudolph as quoted in the last Official action because this statement merely seems to be *generic* to pipe formed of a helical strip interlocked together and has no specific reference to the Brinkman tube which is a *species* of this *genus*. In other words we do not think that a *generic* statement is a dislcosure of a *species* which it does not mention. We think there can be no controversy over the fact that Rudolph does not disclose the same kind of a tube as the Brinkman tube. The Rudolph tube depends for its flexibility upon sliding in the joint and not upon relative movement of the sides of the corrugations as in the Brinkman tube.

We would request that it be distinctly borne in mind that we are not claiming a braided covering per se nor the Brinkman tube per se, but are claiming a combination of this covering with the Brinkman tube and this involves considerations which are not presented by the prior structures. The application of the braided covering to
66 the Rudolph tube does not teach anything of the co-operative advantages of this covering when applied to the tube of the prior Brinkman patent cited. For instance the Brinkman tube must be tight in its joint and depend upon the relative movement of the corrugation sides for flexibility, in order to function properly. When,

however, there is a twist upon the Brinkman tube, as to which it is peculiarly vulnerable, sliding of the joint parts with relation to each other is liable to take place and so the tightness of the joint is frequently destroyed and the proper functioning of the tube prevented. The application of the helically stranded covering to this Brinkman tube prevents its twisting, and in exerting the resistance to this twisting the helical strands bear against the radially extending sides of the corrugations so that the tube is reinforced in its resistance to the compressing action of the strands. The result is a structure which has all of the advantages of the Brinkman flexible tube but wherein its weaknesses, as indicated, are removed and a firm, strong structure is obtained by relative cooperation of the parts as stated.

It is quite evident to us that this structure is not shown or foreshadowed in Rudolph, the prior patent to Brinkman, Witzenmann or any of the other prior patents, the claims differentiate and we submit, therefore that applicant is entitled to claims on the structure which he has invented. It may be stated that this structure has gone into extremely wide commercial use and if the Examiner should so request, we would be glad to file affidavits to that effect. We request most careful reconsideration of this case and believe that it should be found allowable.

While it seems evident to us that the main refer-
67 ence, namely the Rudolph patent, embodies entirely
different ideas of cooperative relationship of the parts, it may be noted that one of the main features of the present invention is to prevent twisting of the Brinkman tube so as to avoid possible loosening of the joint. No such conception could have arisen in connection with the Rudolph patent because, the parts being normally slidable in the Rudolph joint, it would do no harm if they did slide under a twisting action. And the present invention goes further in that it reenforces the pressure of the stranded covering on the tube, occasioned by attempted twisting of the tube, by opposing the radial sides of the corrugation to the strand pressure. Altogether we do not find in any or all of the references cited a conception of the cooperative relationship of the Brinkman tube and the helically stranded covering, nor do we find a structure possessing the character-

istics of the structure formed by combining this covering with the Brinkman tube, the claims differentiate, and we confidently submit that they should be allowed.

Reconsideration of each and all of the claims now presented and of the application as a whole is requested. It is submitted that the application is now in condition for allowance and such action is accordingly solicited.

Respectfully submitted,

THOMAS HOWE,
Attorney for Applicant.

Dated, New York, N. Y., January 27, 1926.

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68 Mailed Feb. 12, 1926.

Div. 39, Room 220.

Paper No. 11.

2—260.

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

All communications respecting this application should give the serial number, date of filing, and name of the applicant.

SS:W.

Department of Commerce, United States Patent Office, Washington.

Applicant: Louis H. Brinkman. Ser. No. 339,620. Filed Nov. 21, 1919. For Tube.

Please find below a communication from the Examiner in charge of this application.

THOMAS E. ROBERTSON,
Commissioner of Patents.

Thomas Howe,
2 Rector St.
New York, N. Y.

Responsive to letter filed Jan. 28, 1926.

Applicant's argument has been carefully considered but it is still not seen wherein applicant has accomplished anything new in the art. Rudolph, Kelso, Smith and the Witzenmann patents of record show the use of a braided metallic covering to protect an inner tube from distortion to be quite conventional. Consequently sheathing to prevent its distortion is obvious to any one skilled in the art.

The claims are, therefore, finally rejected on the references and for the reasons of record in accordance with ex parte Ball 329 O. G. 4, the present subject matter having been pending before the Office for more than 10 years.

A. W. COWLES,
Examiner.

U. S. Patent Office Feb. 12, 1927. Division XXXIX.

69 Board of Examiner-in-Chief, U. S. Patent Office, Feb. 12, 1927

In the United States Patent Office.

Room 220, Division 39.

Application of Louis H. Brinkman. Tube. Filed November 21, 1919. Serial Number 339,620.

Ex Parte Appeal to the Board of Examiners-in-Chief.

Honorable Commissioner of Patents,
Washington, D. C.
Sir:

I hereby appeal to the Examiners-in-Chief from the decision of the primary Examiner in the matter of my application for letters patent for an improvement in Tube filed November 21, 1919, Serial Number 339,620 of which claims (1 to 5 inclusive) were on February 12, 1926, finally rejected. The following are the points of the decision on which the appeal is taken:

1. The primary Examiner erred in rejecting each and all of claims (1 to 5 inclusive) in this application.
2. The primary Examiner erred in not allowing each and all of claims (1 to 5 inclusive) in this application.
3. The primary Examiner erred in rejecting the claims (1 to 5 inclusive) "on the references and for the reasons of record".

4. The primary Examiner erred in not allowing the application as it stands.

The appeal fee of Ten Dollars is enclosed herewith.

Respectfully,
LOUIS H. BRINKMAN,
By THOMAS HOWE,
His Attorney.

70 Mailed Feb. 19, 1927.

In the United States Patent Office.

In re application of Louis H. Brinkman. Ser. No. 339,620.
Filed Nov. 21, 1919. Tube.

Before the Board, Examiners-in-Chief on Appeal.

Attorney: Thomas Howe, 2 Rector St., New York City.

Examiner's Statement.

Appeal is taken from the action of the Primary Examiner in finally rejecting the following claims:

1. The combination with a corrugated tube depending for its flexibility on relative movement of the corrugation sides, of a strand outside the corregations of said tube and bearing upon said corrugations, said strand being wound helically about said tube and connected to the ends of said tube.
2. The combination with a corrugated tube depending for its flexibility on relative movement of the corrugation sides, of strands helically wound about said tube in opposite directions, bearing against said corrugations and connected to the ends of said tube.
3. The combination with a flexible tube comprising a helically disposed strip having a central longitudinal groove forming a corrugation and having the adjacent edges of contiguous convolutions interfolded, said tube depending for flexibility on relative movement of the corrugation sides, of strands wound helically about said tube in opposite directions, bearing against said corrugations and connected to the ends of said tube.
4. The combination with a flexible corrugated tube formed of a helically disposed strip having a central longitudinal

groove forming a corrugation and the adjacent edges of contiguous convolutions interfolded, said tube depending for flexibility upon relative movement of the corrugation sides, fittings secured to said tube at its ends, and strands helically wound about said tube in opposite directions bearing against said corrugations and secured to said fittings.

5. The combination with a corrugated tube depending for flexibility upon relative movement of the corrugation sides formed of a helical strip having the edges of adjacent convolutions in engagement, of means for preventing twisting of the said tube whereby tendency to cause sliding in the joint between adjacent convolutions is overcome.

The references relied upon by the Examiner are
71 the patents to:

Brinkman, 1,198,392, Feb. 25, 1916, 137-75F.
Rudolph, 1,054,244, Feb. 25, 1913, 285-72.
Kelso, 606,557, June 28, 1898, 137-90.
Smith, 762,954, June 21, 1904, 137-90.
Witzenmann, 993,934, May 30, 1911, 137-75F.
Witzenmann, 933,516, Sept. 7 1909, 137-75F.
Witzenmann (French), 328,650 of 1903, 137-75F.

The alleged invention is a hose formed of two elements. The inner element, known as a Brinkman tube, is a flexible, corrugated metal tube which depends for its flexibility solely on the relative movement of the corrugation sides longitudinally of the tube. In order to insure the inner element against twisting a braided cover is applied since a braided covering has the property of being non-distortable. Such covering is flexible, however, by reason of being capable of longitudinal movement upon a change of diameter. The properties of this type of covering are described in more detail in the Kelso and Smith specifications.

The Brinkman patent shows a tube which is identical in construction to the tube in the present application while the Rudolph, Kelso, Smith and Witzenmann patents show braided coverings identical to applicant's covering. This is admitted by the applicant.

The claims are rejected on the Brinkman patent in view of either Rudolph, Kelso, Smith or Witzenmann. The secondary art shows the use of a braided metallic covering to protect an inner tube against distortion to be quite conventional. The braided covering of the secondary art performs the same function to the enclosed tube which applicant's covering does, that is, prevents distortion of the enclosed tube. When the covering of the secondary art is applied to the Brinkman tube, it exhibits no property or capacity not realized by one skilled in the art through operation of it in its known use. Consequently to fortify 72 the Brinkman tube in the manner suggested by the secondary art does not require the exercise of invention.

A. W. COWLES,
Examiner.

73 201 a.

Address only The Commissioner of Patents, Washington, D. C.

Department of Commerce, United States Patent Office,
Washington.

Appeal No. 1253, Paper No. 14.

Notice of Hearing.

February 21, 1927.

SIR:

The case of Louis H. Brinkman Serial [Interference]* No. 339,620, will be heard by the Examiner in Chief on the 28th day of September, 1927.

The hearings will commence at one o'clock and as soon as the argument in one case is concluded the succeeding case will be taken up.

If any party, or his attorney, shall not appear when the case is called, his right to an oral hearing will be regarded as waived.

The time allowed for arguments is as follows:

Ex parte cases, thirty minutes;

Inter partes appeals final hearing, one hour each side.

By special leave, obtained before the argument is commenced, the time may be extended.

[*Words and figures enclosed in brackets erased in copy.]

The appellant shall have the right to open and conclude in inter partes cases, and in such cases a full and fair opening must be made.

Briefs in inter partes appeals must be filed in accordance with the provisions of Rules 144 and 163.

Respectfully,

THOMAS E. ROBERTSON,
Commissioner of Patents.

To Thomas Howe, Esq., 2 Rector Street, New York, N. Y.

74 U. S. Patent Office, May 6, 1927. Division XXXIX.

Mail Room, U. S. Patent Office, May 6, 1927.

Board of Appeals, U. S. Patent Office, May 6, 1927.

In the United States Patent Office.

Div. 39, Room 220.

Application of Louis H. Brinkman. For Tube. Filed November 21, 1919. Ser. No. 339,620.

Honorable Commissioner of Patents,
Washington, D. C.

Sir:

Please change the address of the attorney in the above case from 2 Rector Street, New York, N. Y., to 74 Trinity Place, New York, N. Y.

THOMAS HOWE,
Attorney for Applicant.

Dated New York, N. Y., May 2, 1927.

75 Board of Appeals, U. S. Patent Office, Sep. 28, 1927.

Appeal No. 1253, Paper No. 16 Brief.

In the United States Patent Office.

Application of Louis H. Brinkman. Tube. Serial No. 339,620. Filed Nov. 21, 1919.

Ex Parte Appeal to the Examiners-in-Chief from Final Rejection by the Primary Examiner.

The subject matter of this appeal is a flexible tube. The basis of the structure here claimed is the so-called Brink-

man tube, as shown in the patent No. 1,198,392 to Brinkman, which is one of the references cited by the Examiner. This Brinkman tube, as set forth in the reference, is formed by helically coiling a strip, which has a central longitudinal groove, which, in the completed tube, forms a corrugation, the edges of the helically coiled strip being firmly interfolded together so that the seam or joint is fixed and immovable, flexibility being provided by the movement of the corrugation sides toward and from each other. This Brinkman tube has numerous advantages, including ease of manufacture, absence of packing, and in order that ease of flexibility may be provided, it is generally essential that the
material of the strip shall be very thin so that the
76 corrugations may bend easily, and this thinness of
the strip is permitted by the fact that there are not
in the joint, or elsewhere in the tube, any relatively moving parts which rub on each other so that the material of the strip, not being called upon to withstand such wear, may be thin. While this prior Brinkman tube was excellent for many purposes and has the advantage as specified, it was vulnerable to tensile and torsional stresses. The torsional stresses might cause the convolutions of the strip to relatively slide in the joint, thereby reducing its firmness and tightness. The Brinkman tube was particularly vulnerable in regard to the torsional stresses. Also, if undue tensile stresses were applied longitudinally of the tube, it might be distorted because, as we have seen, the material is ordinarily very thin. In this situation, the present invention was made whereby the vulnerability of the tube as referred to was removed, a firm non-distortable but easily flexible hose was produced and this consistently with the characteristics of operation and structure of the prior Brinkman tube, as has been above referred to.

In other words, Mr. Brinkman, noting disadvantages in connection with his tube, proceeded to rectify them suc-
cessfully, and this he did by combining the Brink-
77 man tube with means which, although it might *per se*
be old, was combined with the Brinkman tube accord-
ing to a conception not shown or hinted at in any of the references. Mr. Brinkman solved the problem (and this forms the subject matter of the present appealed matter) by the

conception that he could relieve against the dis-advantage of his former Brinkman tube by combining his tube with a helically stranded covering, and that he could do this without using heavier material in his tube and so reducing its flexibility, because he conceived the light material necessary to best flexibility and working could still be used, as the corrugations would cause the material of the tube (the sides of the corrugations) to be presented edgewise to the force of the radial contraction of the covering occasioned by tensile stress, so that even this light material would be able to withstand the crushing effect of its radial contraction in the same manner that the tin web of an I-beam is able to resist greater deflecting forces than the same amount of material otherwise disposed; and accompanying this the structure had the property of resisting torsional stresses and so protected the tube against sliding in the joint, as has been referred to. No such conception is shown or foreshadowed in the references cited, and we sub-
78 mit therefore that the combination of this present
application involves a new and useful relationship of elements which is not apparent from the references cited. In fact, the combination here presented is unusually ingenious in the production of a structure overcoming numerous difficulties in a very simple and effective manner.

The position of the Examiner seems to be that the present claims are unpatentable because the Brinkman tube of his reference patent, forming one element of the claims, is old, and the stranded covering, forming another element of the claims, is old, as shown in the other prior patents referred to, and that there is no invention in combining the two. As we have pointed out above, however, the combining of the Brinkman tube and the stranded covering effects a peculiar cooperation of the parts which is not hinted at in any way in the prior art. In other words, a new combination has been produced, which gives a highly meritorous structure and which has been enthusiastically received by users and has gone into wide commercial use. It is therefore submitted that Mr. Brinkman should be protected in this improved combination which he has made as well as in his fundamental tube.

79 With regard to the Smith and Kelso patents. Kelso only shows a rubber tube in connection with

the stranded sheathing. It is not used in connection with any corrugated tube or, in fact, with any metal tube at all. Smith shows the same thing and also a coil of wire which has no joints nor any corrugations, and obviously does not in any way correspond to the Brinkman tube, or possess its characteristics or advantages.

Concerning the two Witzenmann U. S. patents, the later one (993,934) does not show how the tube is constructed. There is no sectional view. In the other patent (933,516) a sectional view of the tube is shown and it there appears that this is simply an old form of tube wherein the flexibility is provided by sliding in the joint, clearances being provided for that purpose. It seems only fair to assume therefore that this is the form of tube in the later Witzenmann U. S. patent. So far as can be seen the two tubes appear to be alike. They are not corrugated tubes at all. Certainly not in the sense that the Brinkman tube is a corrugated tube, wherein flexibility is provided by the relative movement of the corrugation sides. The appearance of being corrugated, as exists in some of the views of the
80 Witzenmann patents, is simply the ridge formed by
the seam and is not a corrugation at all. In neither of these Witzenmann patents, therefore, since the joint is loose, is there any necessity for preventing torsional sliding in the joint, because such sliding would do no harm if it occurred. Furthermore, it does not appear that the braided covering of Witzenmann is anything more than a protecting armour. It does not appear that this braided covering is secured to the coupling or to a tube. In fact, the indications are that it is not because other means are provided for preventing elongation of the tube under tensile stress. It thus appears that these Witzenmann patents do not present any of the problems solved by Mr. Brinkman in connection with the present case, to say nothing of solving them, and they do not show or foreshadow the combinations of the appealed claims. The Witzenmann French patent also indicates the same kind (slip-jointed) of a tube as the other Witzenmann patents, but no sectional view is shown to show what the structure is, nor are any couplings shown to which the braided covering could be secured, and it is not set forth that it is secured to any thing, but it may simply act as a protecting armour.

The Rudolph patent also indicates the same kind of a tube within the braided covering as in the Witzenmann patents, so that the remarks in relation to these patents also apply to the Rudolph patent. 81

Nowhere in any or all of the references do we find the combination here claimed nor anything which foreshadows it or involves its conception.

Referring specifically to the claims. It will be seen that all of them are limited to a tube depending for flexibility upon a relative movement of the corrugation sides, and claims 3, 4, and 5 are limited to such a tube formed of a helically disposed strip; while claims 3 and 4 are quite specifically limited to the structure shown and described in the present application.

It is submitted that none of the claims in terms or substance is met by any or all of the references, that they involve a new and useful conception, and that the action of the Primary Examiner in rejecting these claims should be reversed and the claims allowed.

Respectfully submitted,

THOMAS HOWE,
Attorney for Brinkman.

September 28, 1927.

82 U. S. Patent Office, Board of Appeals, Dec. 15. 1927. Mailed.

Appeal No. 1253. Paper No. 17.

NLH.

In the United States Patent Office, Before the Board of Appeals.

Ex Parte Louis H. Brinkman.

Application for Patent Filed November 21, 1919. Serial No. 339,620. Tube.

Mr. Thomas Howe for applicant.

Decision.

The applicant appeals from a final rejection of claims 1 to 5 inclusive. Claim 1 is reproduced for illustrative purposes:

1. The combination with a corrugated tube depending for its flexibility on relative movement of the corrugation

sides, of a strand outside the corrugations of said tube and bearing upon said corrugations, said strand being wound helically about said tube and connected to the ends of said tube.

The references cited are:

Kelso et al., 606,557, June 28, 1898.
Smith, 762,954, June 21, 1904.
Witzenmann, 933,516, Sept. 7, 1909.
Witzenmann, 993,934, May 30, 1911.
Rudolph, 1,054,244, Feb. 25, 1913.
Brinkman, 1,198,392, Sept. 12, 1916.
Witzenmann, *Fr.*, 328,650, of 1903.

What appellant is claiming is an inner corrugated tube reinforced by a braided covering. The inner tube is 83 disclosed in appellant's prior patent No. 1,198,392 while the remaining references show inner tubes, some of them formed of helically coiled wire reinforced by a braided covering. The statement on appeal calls attention to the fact that some of the secondary or supplementary references, particularly the patents to Kelso et al. and Smith, describe the characteristics of the braided outer tube which render it useful as a covering for a helically formed inner tube. It is the view of the examiner that it did not involve invention to apply to the old Brinkman tube, the equally old braided covering of the other references.

The appellant urges that there is a special cooperation between the Brinkman tube and the braided covering therefor and that by bringing together the two elements a new combination is produced. It is true that appellant's complete tube is not disclosed in any single reference but it seems to us that if one using the Brinkman tube found that it yielded too readily to forces tending to distort it the remedy was obvious and was taught by such references as Rudolph, Kelso et al., Smith or the Witzenmann patents. We think the appealed claims do not represent patentable invention.

The decision of the examiner is affirmed.

Limit of Appeal to Court of Appeals, forty days. Rule 149.

M. J. MOORE,
Assistant Commissioner,
E. S. HENRY,
Examiner-in-Chief,
W. S. RUCKMAN,
Examiner-in-Chief,
Board of Appeals.

December 15, 1927.

84 Department of Commerce, United States Patent Office, Washington.

Address only the Commissioner of Patents, Washington, D. C.

JRS.

Ex Parte Louis H. Brinkman. Serial No. 339,620. Filed November 21, 1919. Tube.

Notice of Suit Under Section 4915 *R. S.*

A suit in Equity under Section 4915 R. S., entitled The Titeflex Metal Hose Co., Plaintiff, vs. Thomas E. Robertson, Commissioner of Patents, Defendant, Equity No. 48,467, involving this application, was filed on June 13, 1928, in the Supreme Court of the District of Columbia.

T. A. HOSTETLER,
Solicitor.

Decree dismissing bill signed June 27, 1930.
Appeal noted.

85 2—421.

[1918]* 1919.

Contents.

1. Application — papers.
2. Amdt. A, Mar. 2, 1920.
3. Rej., July 1, 1920.

[*Words and figures enclosed in brackets erased in copy.]

4. Argument, July 1, 1921.
5. Rejection, Sept. 23, 1922.
6. Amdt. B, Sept. 22, 1823.
7. Rej., Jan. 23, 1924.
8. Amdt. C, Jan. 23, 1925.
9. Rej., Jan. 28, 1925.
10. Reconsideration rgsd., Jan. 28/26.
11. Final Rej., Feb. 12, 1926.
12. Appealed, Feb. 11/27.
13. Exrs. Answer, Feb. 19, 1927.
14. Hearing, Sept. 28, 1927.
15. Change of Address of Atty., May 5/27.
16. Brief, Sept. 28/27.
17. Decision by Board, Dec. 15, 1927.
18. Notice of Suit under Sec. 4915 R. S.
19.
20. [Illegible.]
21. [Illegible.]
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27. New case.
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(Here follows photolithographed page No. 86.)

87 In the Supreme Court of the District of Columbia,
October Term, 1929.

In Equity.

#48,467.

Titeflex Metal Hose Co.

vs.

Robertson, Commissioner of Patents.

Defendant's Exhibit D^1.

Oct. 9, 1930.

(Here follow pages 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, and 103.)

104 Mailed Feb. 19, 1927.

In the United States Patent Office.

Before the Board, Examiners-in-Chief on Appeal.

In re application of Louis H. Brinkman. Ser. No. 339,620.
Filed Nov. 21, 1919. Tube.

Attorney: Thomas Howe, 2 Rector St., New York City.

Examiner's Statement.

Appeal is taken from the action of the Primary Examiner in finally rejecting the following claims:

1. The combination with a corrugated tube depending for its flexibility on relative movement of the corrugation

No. 5307
The Titeflex Metal Hose Co.,
Appellant,
vs.
Thomas E. Robertson, Commissioner
of Patents of the United States.

Fig:1.

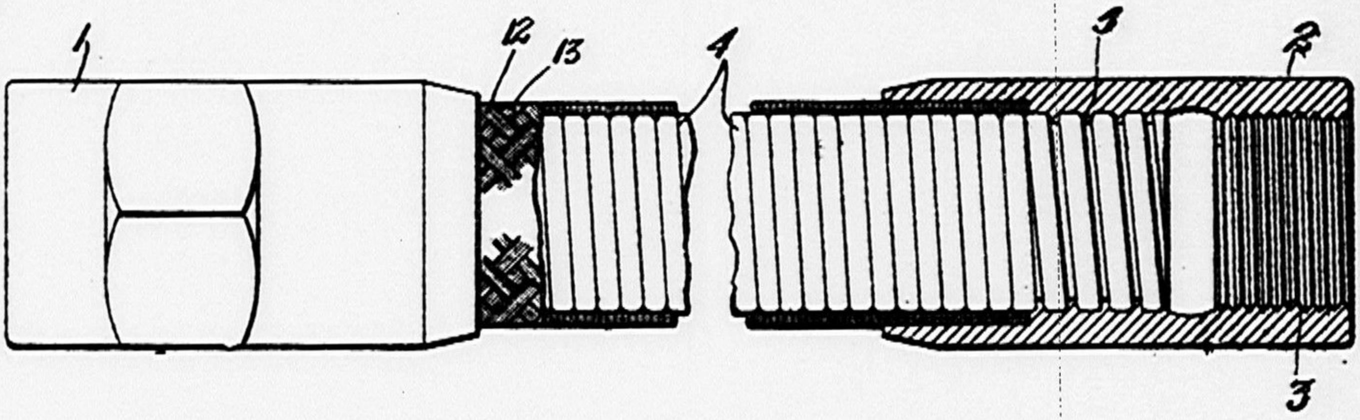
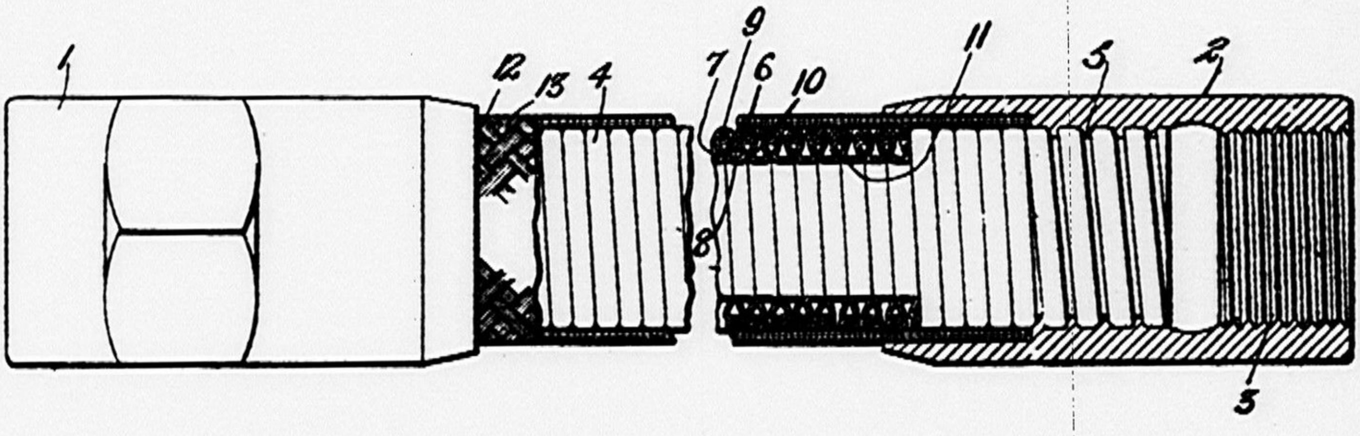


Fig:2.



Louis H. Brinkman Inventor

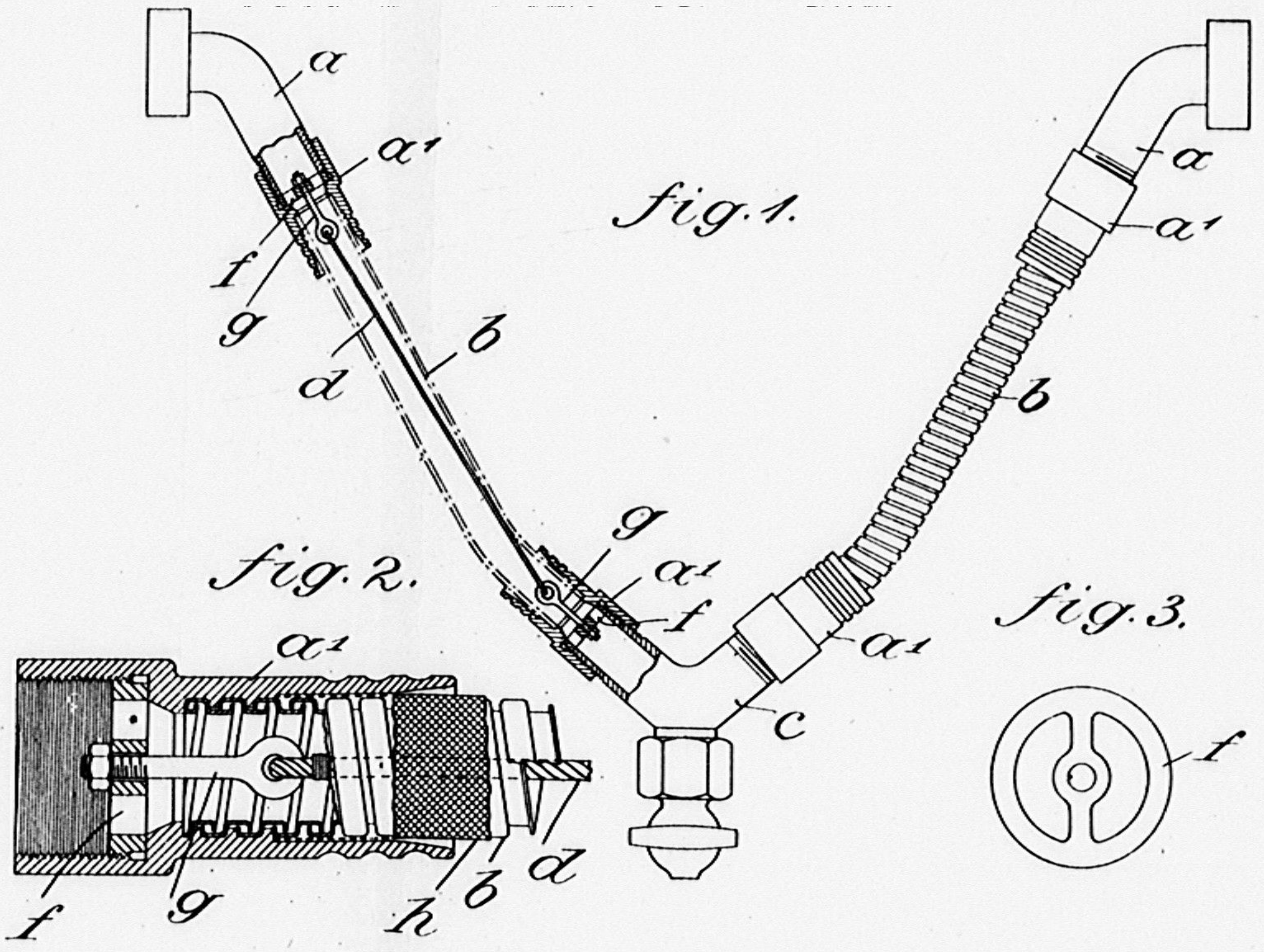
By Thomas Howe Attorney

E. WITZENMANN.

CONNECTING HOSE FOR RAILWAY CARS.

APPLICATION FILED NOV. 14, 1906.

933,516. Patented Sept. 7, 1909.



Witnesses:
P. F. Nagle
C. D. McVay

Inventor:
Emil Witzenmann,
By Diedersheim & Fairbanks,
Attorneys.

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UNITED STATES PATENT OFFICE.

EMIL WITZENMANN, OF PFORZHEIM, GERMANY.

CONNECTING-HOSE FOR RAILWAY-CARS.

933,516. Specification of Letters Patent. Patented Sept. 7, 1909.

Application filed November 14, 1906. Serial No. 343,321.

To all whom it may concern:

Be it known that I, Emil Witzenmann, a subject of the Grand Duke of Baden, manufacturer, residing at No. 48 Holzgartenstrasse, Pforzheim, German Empire, have invented new and useful Improvements in Connecting-Hose for Railroad-Cars, of which the following is a specification.

My invention relates to hose such as is used on railroad cars for connecting the heating or brake pipes.

The invention consists in the provision of means for relieving the hose sections which lie between two cars from the detrimental strains to which they are subjected owing to the pull of the coupling members hanging from the hose sections.

The object in view is attained by the connecting members (on the cars) for the hose sections being connected with the pendent coupling which joins the two hose sections by wires, ropes, chains, or the like, so that the latter and not the hose parts take up the weight of the coupling parts hanging from the hose sections. This arrangement is particularly suitable for the heating or brake hose of those railroad cars in which the connection of the heating or brake pipes between the separate cars is effected by so-called metallic spiral hose, that is to say, hose which consists of a metallic band of suitable cross section wound on itself. For with such hose it is of great importance to prevent forcible sundering of the overlapping edges of the metal band.

Two forms of construction of the invention are illustrated in the accompanying drawing.

Figure 1 is a side elevation and part section of one form, in which an integral rope is employed. Fig. 2 is a longitudinal sectional view illustrating on a larger scale the means adopted for securing the hose ends to the connecting-sleeves. Fig. 3 is one of the disks by which the rope ends are held.

a a are the connecting-pieces for the two hose sections *b b*, which are tightly screwed into the sleeves of a^1 of the parts *a a* and at the other end joined together by means of the coupling-piece *c* of familiar construction, which may be provided with an outlet cock. The hose sections *b b* are relieved from strain by the connecting-pieces *a a* being joined with the coupling-piece *c* by means of ropes *d* or the like located inside the hose. The connection of the parts *a c* by means of the ropes *d* may be effected, for instance, as shown in Fig. 2, by disks *f* (Fig. 3), being screwed into the sleeves a^1 of the connecting-pieces *a* and of the coupling *c*, and by eye bolts *g* being passed through the said disks.

It will be observed, the hose sections *b b* are entirely relieved from strain, so that there is no danger of the overlapping edges of the metal band forming the hose being injured. The hose sections *b b* may be protected by a plaited or like covering *h* (Fig. 2) if desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

In heating or brake pipes for railroad cars and the like, the combination of hose sections, connecting pieces at the outer ends of said sections, sleeves into which the ends of the hose sections are tightly screwed, a coupling piece having branches screwed into adjacent sleeves, means for relieving the hose sections of strain, comprising flexible means disposed within the hose sections and disks having threaded engagement with said sleeves of the connecting pieces and of the branches of the coupling, and means passed through said disks and to which the ends of the flexible means are directly connected.

In witness whereof I have hereunto signed my name this twenty-fifth day of October, 1906, in the presence of two subscribing witnesses.

EMIL WITZENMANN.

Witnesses:
Ernst Entenmann,
Wm. Hahn.

C. RUDOLPH.
PIPE COUPLING.
APPLICATION FILED FEB. 27, 1909.

1,054,244. Patented Feb. 25, 1913.

Fig. 1

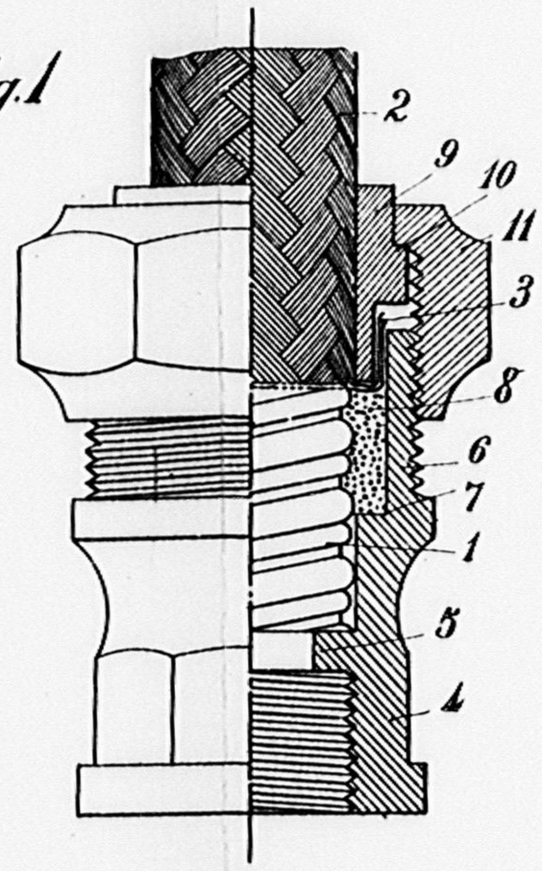


Fig. 2

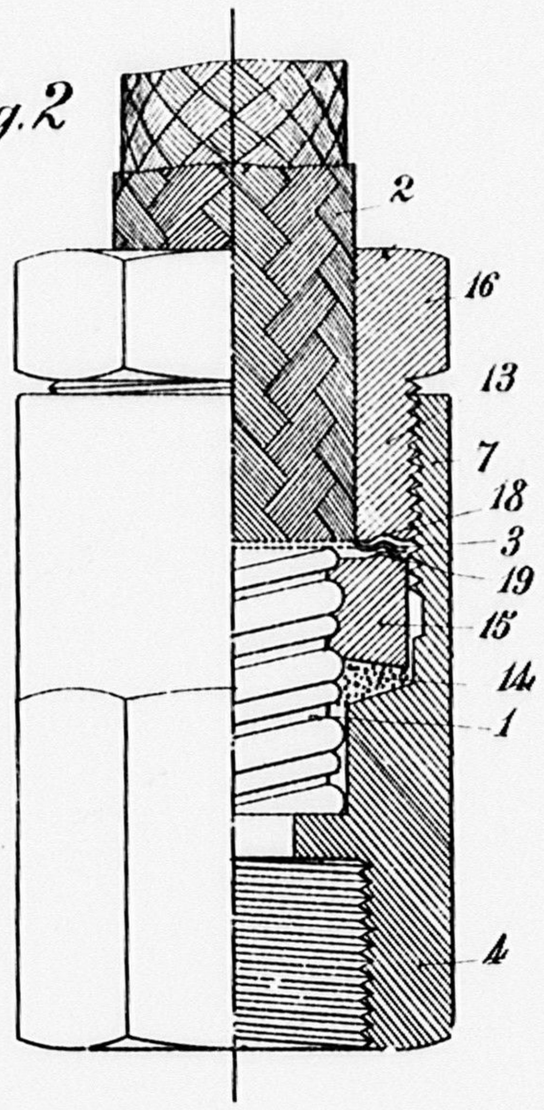


Fig. 4

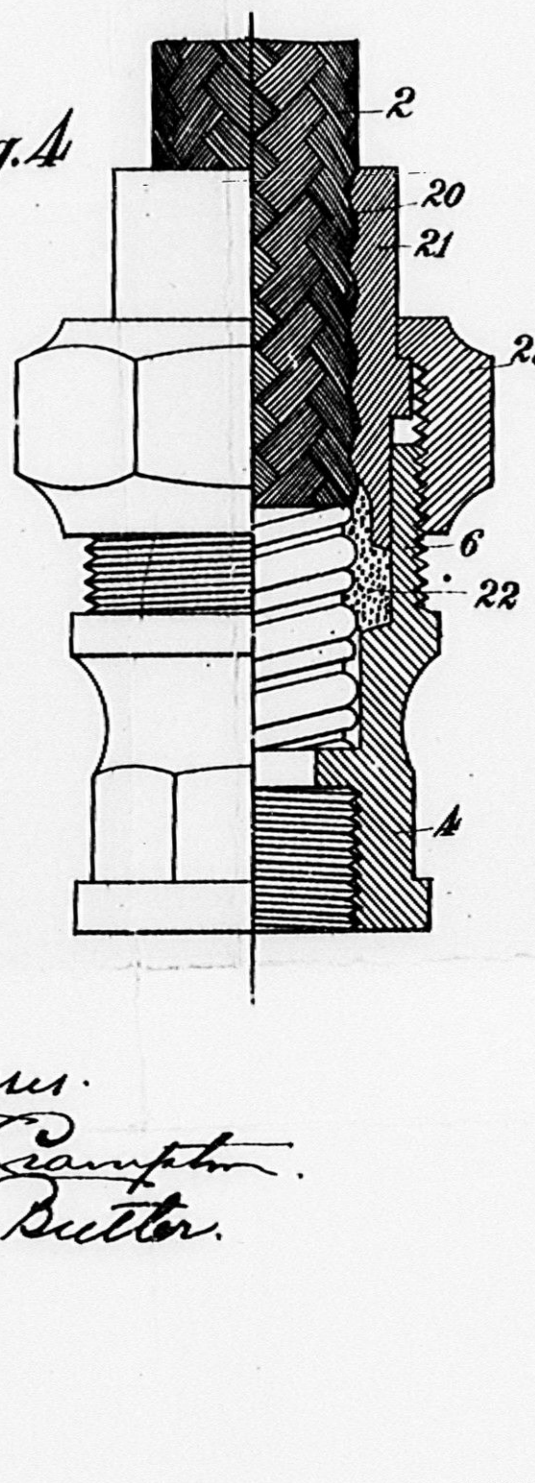
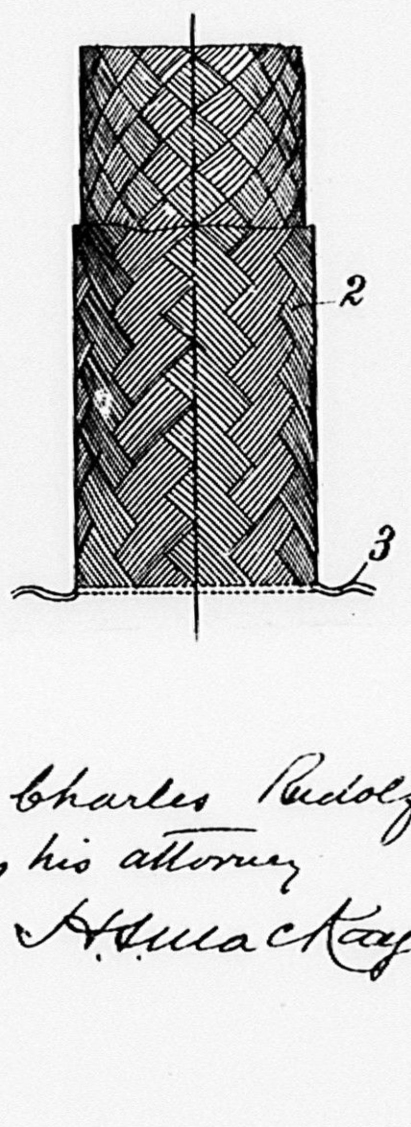


Fig. 3



Witnesses:
F. F. Crampton.
M. A. Butler.

Charles Rudolph
By his attorney
H. S. MacKaye

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from the original bound volume

UNITED STATES PATENT OFFICE.

CHARLES RUDOLPH, OF PARIS, FRANCE, ASSIGNOR TO CHAS. T. SCHOEN, OF PHILADELPHIA, PENNSYLVANIA.

PIPE-COUPLING.

1,054,244. Specification of Letters Patent. **Patented Feb. 25, 1913.**

Appication filed February 27, 1909. Serial No. 480,364.

To all whom it may concern:

Be it known that I, Charles Rudolph, a citizen of the Republic of France, and a resident of 66 Rue du Theâtre, Paris, France, have invented certain new and useful Improvements in Pipe-Couplings, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to carry out the same.

This invention relates to improvements in pipe unions or couplings which are fitted to the ends of flexible metallic pipes and it applies to that kind of pipe which is formed by a suitably shaped metal strip being helically wound, and covered with a sheathing preferably formed by a metallic plait or braiding.

When a coupling piece is fixed to the extremity of a pipe covered with a sheath or cover of the kind indicated, it frequently happens that when the pipe is elongated in consequence of internal pressure, the sheath which covers it slips out of the coupling if it is not firmly fixed and cannot return to its original position when the pipe resumes its normal length.

Now this invention has for its principal object to provide a coupling which embraces the sheath or cover and the pipe in such a way that the sheath can no longer slip out of the coupling but is forced to follow the pipe in its elongations and contractions.

A further object of this invention is the provision of a novel means whereby an air and water tight joint may be produced while at the same time providing further security for the inner tube.

The manner in which the invention is carried out will now be described, reference being made to the accompanying drawings, in which:—

Figure 1 shows partly in elevation and partly in longitudinal section the coupling or union made in accordance with this invention: Fig. 2 is a modification of the coupling shown in Fig. 1; Fig. 3 is an elevation of the sheath or cover with its end expanded, in order to be engaged in the coupling; Fig. 4 is a view partly in elevation and partly in longitudinal section of a modification of the method of carrying out the invention.

The flexible pipe 1 is formed by a suitably shaped helically wound strip of metal the edges of which interlock. This tube or pipe is protected by a sheath or cover 2 formed of a metallic plait or braid. The pipe or tube may be covered with a single sheath, or two sheaths, as shown in Figs. 2 and 3, or with a larger number of sheaths.

Fig. 1 shows a method of fixing both the flexible pipe 1 and its sheath 2 in the coupling. The metallic sheath formed preferably by plaited wires, is stopped at a small distance from the end of the pipe, and the wires are unplaited so as to form an enlargement or extension 3, as shown in Fig. 3. The coupling proper is composed of an internally threaded tubular part 4, having above the threaded part an annular internal rib or shoulder 5 serving as a support and stop for the end of the pipe. The tubular part 4 of the joint is prolonged in an externally threaded socket 6, and packing 8 for insuring the tightness of the joint is lodged in the annular internal space 7. The expanded end 3 of the braided sheath is bent in such a way as to be pressed on the external surface of a packing ring 9 and in this way it is solidly held between the socket 6 and the ring 9. This latter has an annular rib or shoulder 10 against which a nut 11 bears, which is screwed on the socket 6. In this way the pipe and its sheath are both fixed in the coupling piece and cannot escape therefrom. When the packing ring 9 is forced forward by the nut 11, the packing 8 is forced into the spaces between the helices which form the inner tube 1, and there is thus produced an additional securing means for the inner tube. This feature is present in all of the modifications of my device which I have shown.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is;—

A coupling for flexible metallic pipes covered by a plaited sheath, comprising in combination, a packing ring 9, a socket 4 a nut 11 surrounding said ring, threaded to said socket and adapted to draw the two together, and an unplaited portion of the sheath bent outward over said packing ring first at right angles to the pipe and then backward parallel to the pipe between the said packing ring and socket, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of the two subscribing witnesses.

CHARLES RUDOLPH.

Witnesses:
François du Boisroudray,
H. C. Coxe.

L. H. BRINKMAN.

FLEXIBLE TUBE.

APPLICATION FILED SEPT. 7, 1915.

1,198,392.

Patented Sept. 12, 1916.

3 SHEETS—SHEET 1.

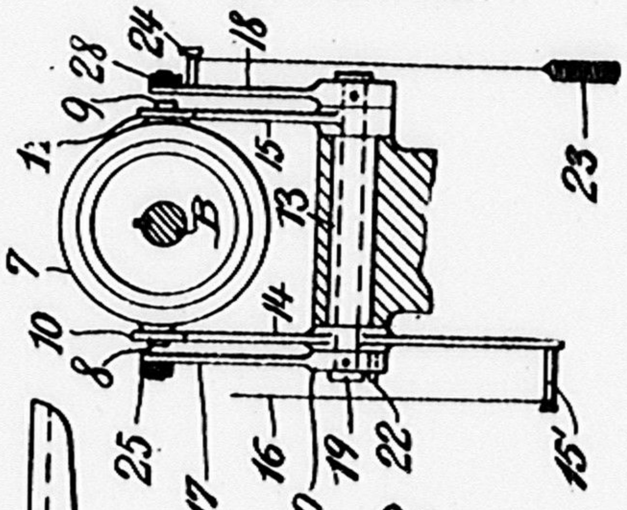
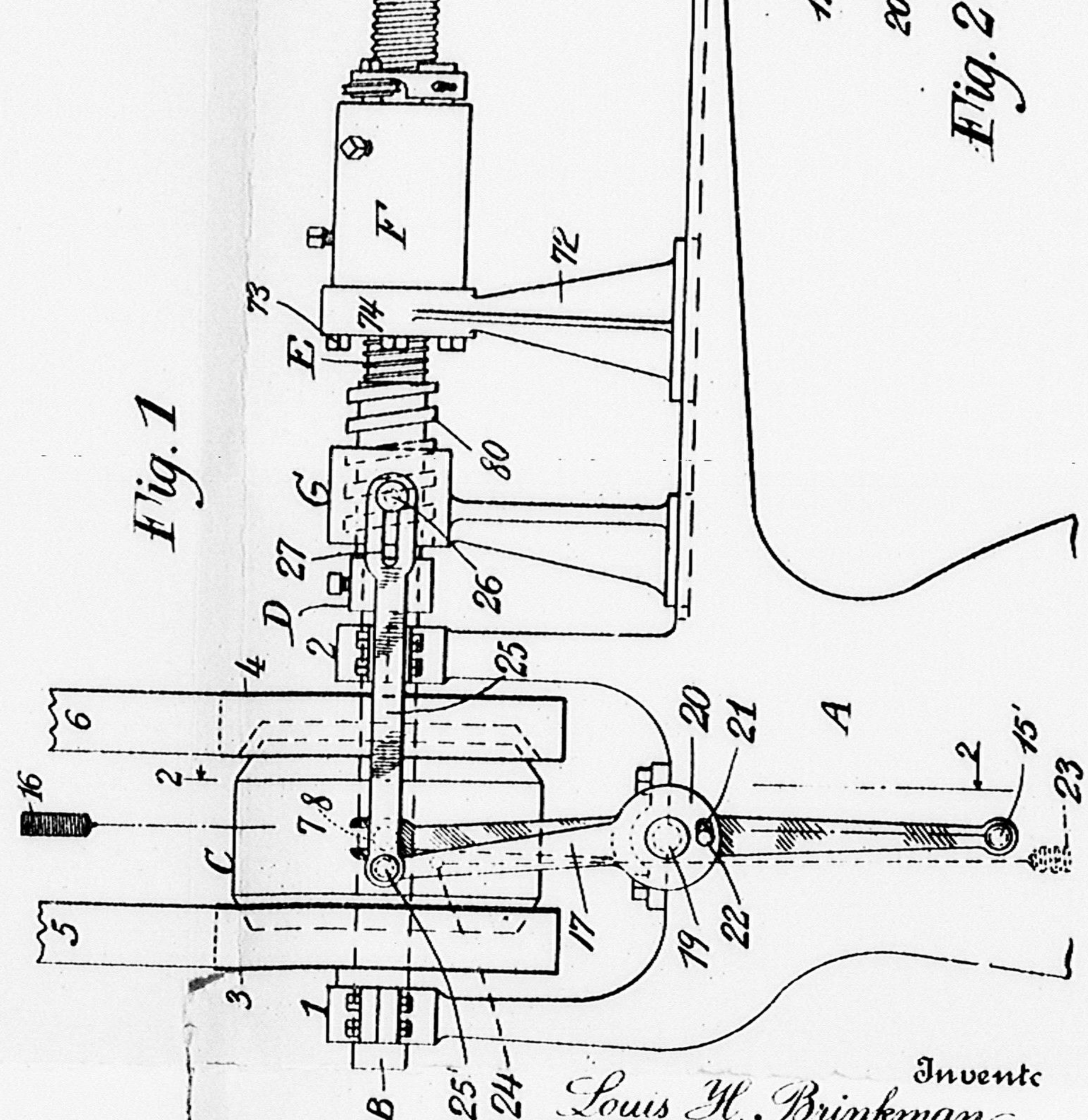


Fig. 2

Fig. 1



Inventc

Louis H. Brinkman

By his Attorney

Thomas Howe

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L. H. BRINKMAN.
FLEXIBLE TUBE.
APPLICATION FILED SEPT. 7, 1915.

1,198,392. Patented Sept. 12, 1916.
3 SHEETS—SHEET 2.

Fig. 3

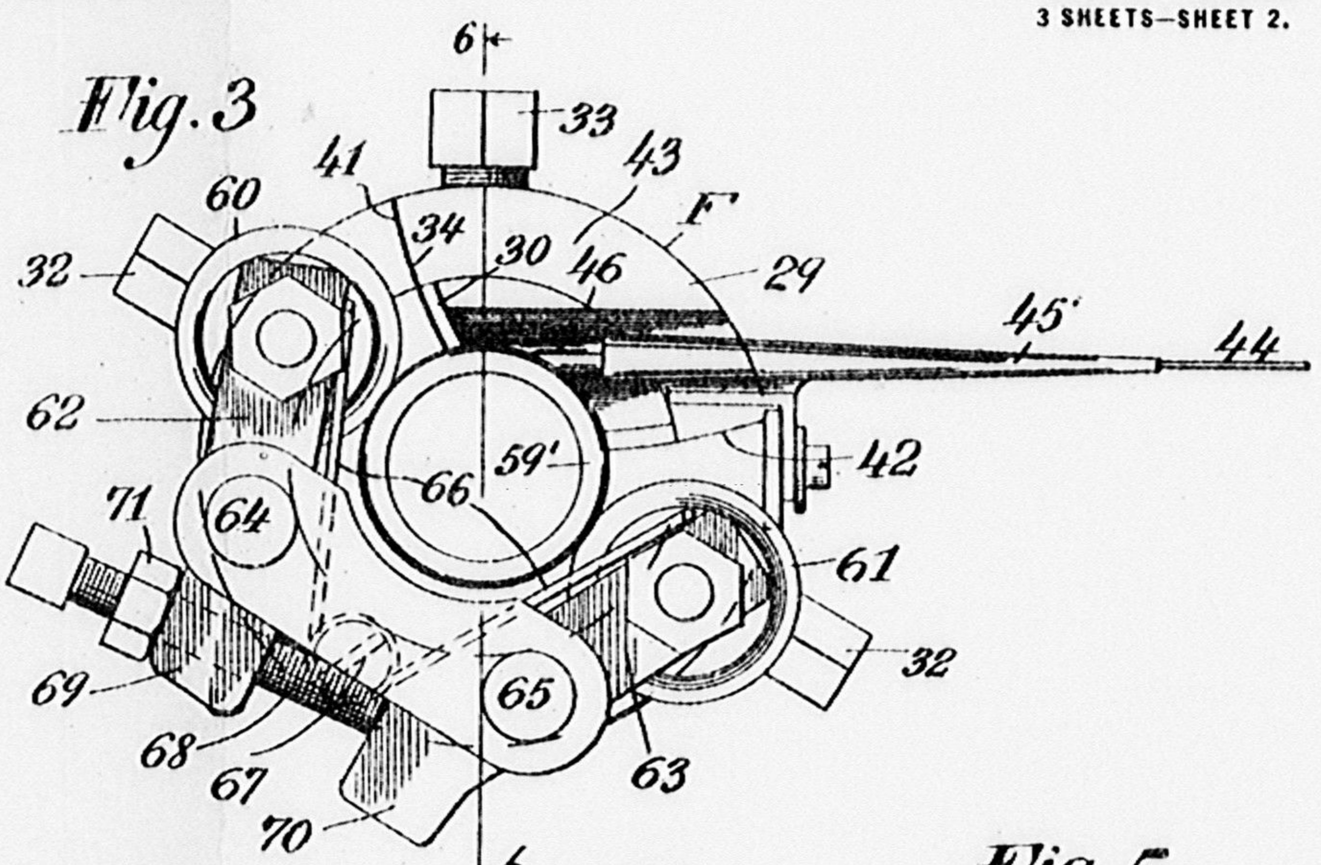


Fig. 5

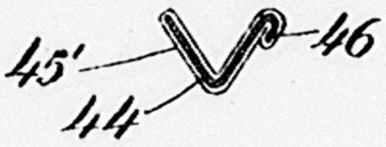
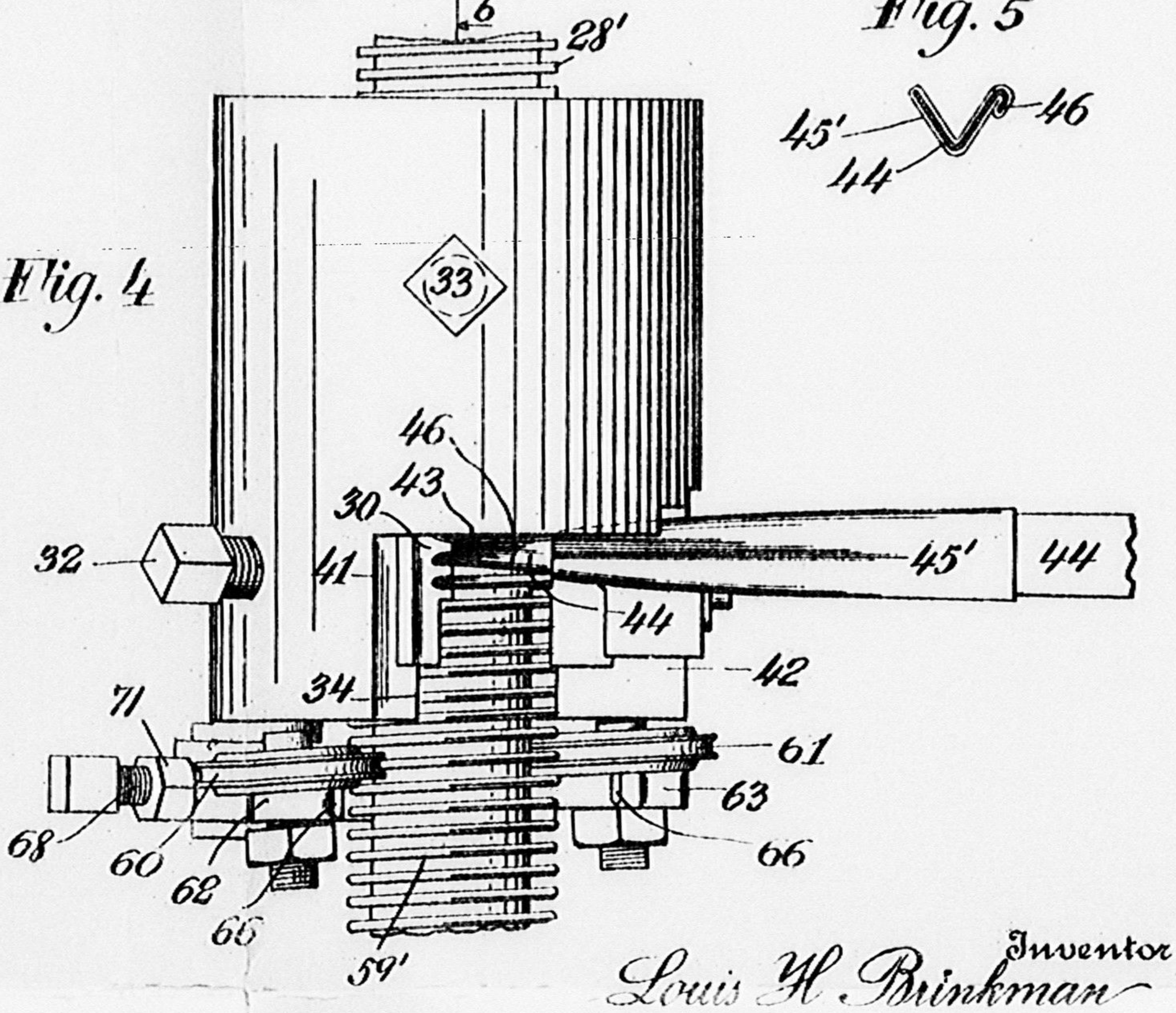


Fig. 4



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FLEXIBLE TUBE.

APPLICATION FILED SEPT. 7, 1915.

1,198,392.

Patented Sept. 12, 1916.

3 SHEETS—SHEET 3.

Fig. 6

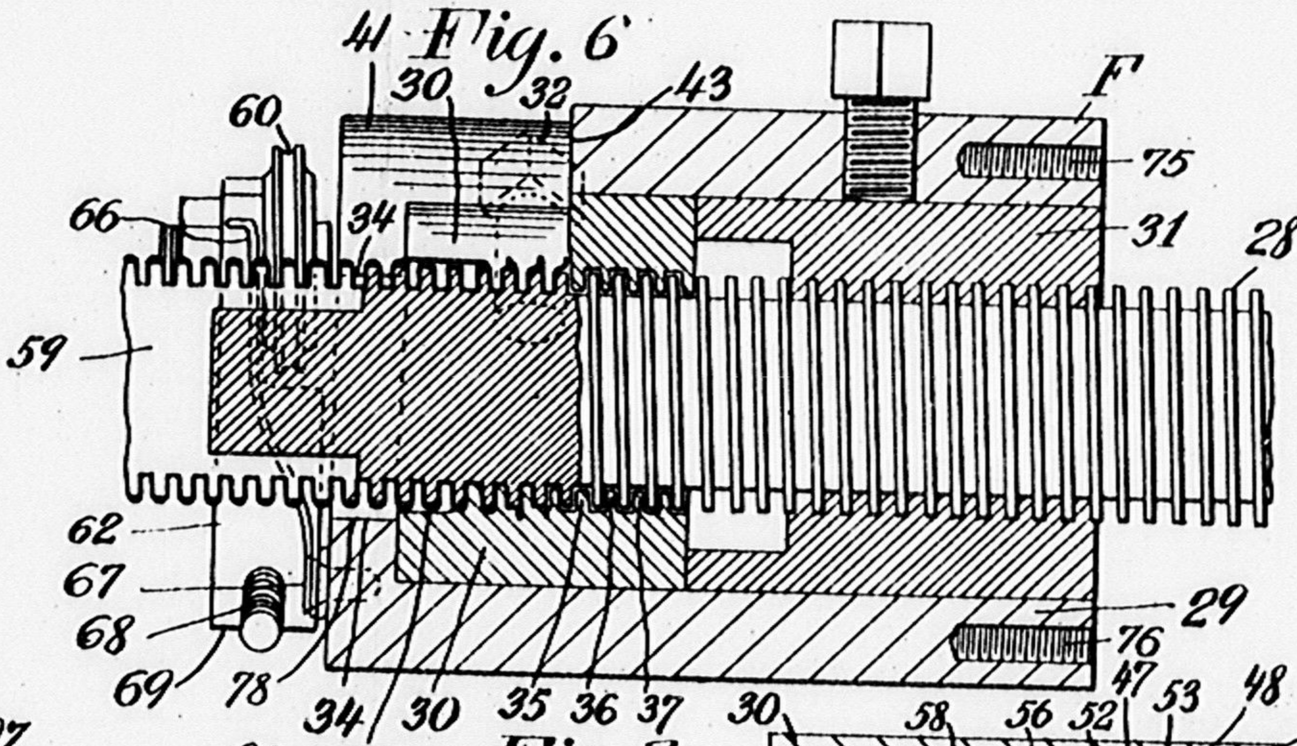


Fig. 7

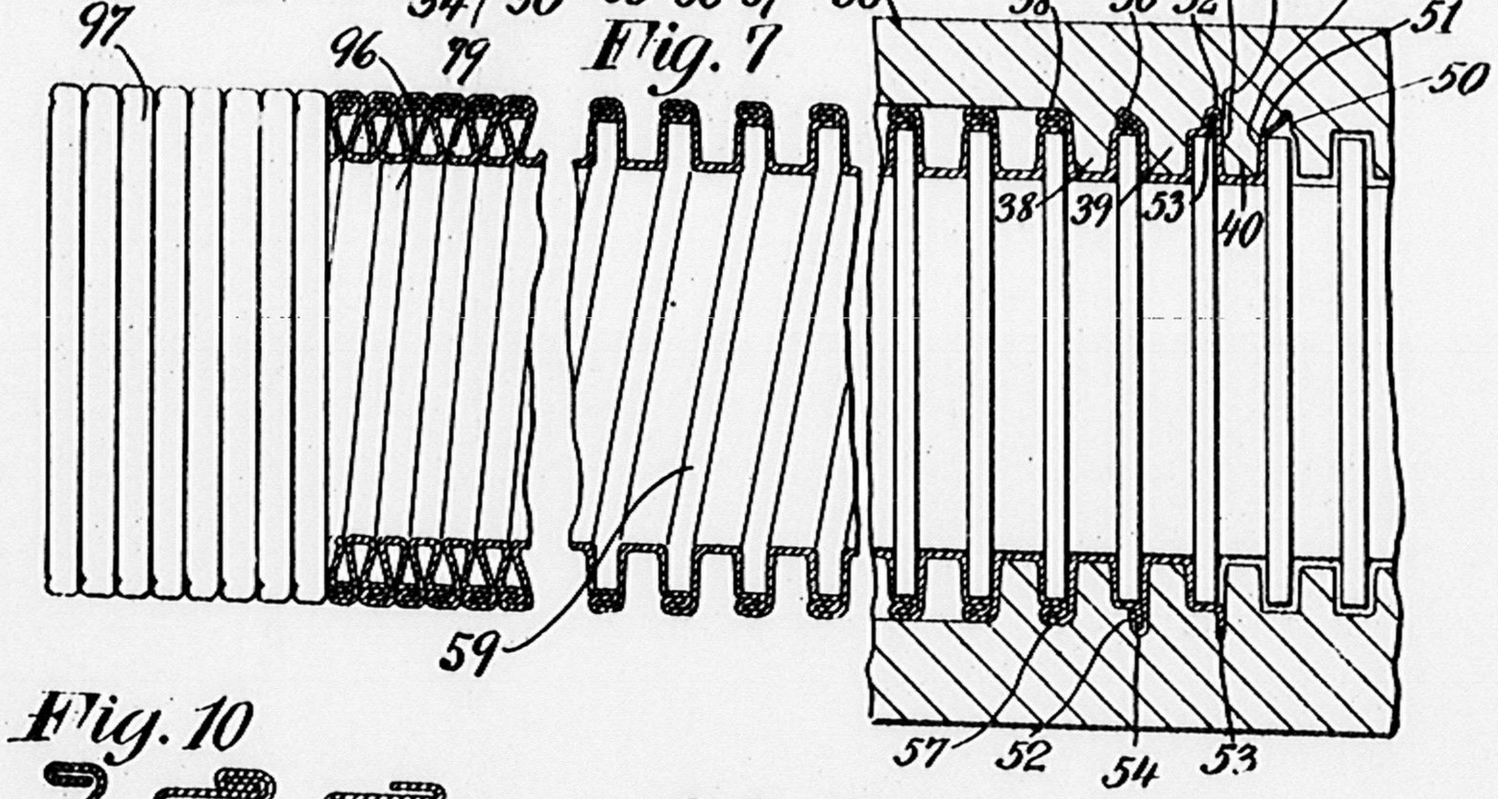
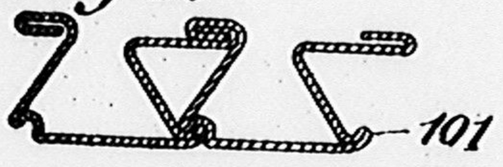


Fig. 10



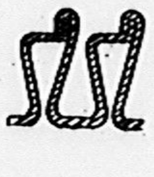


Fig. 8

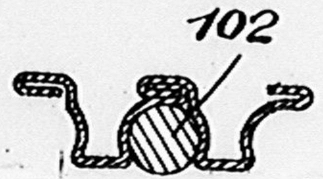


Fig. 11

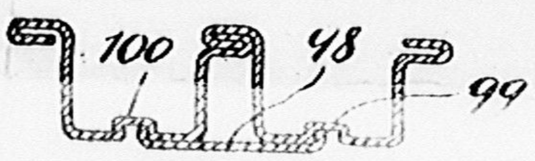


Fig. 9

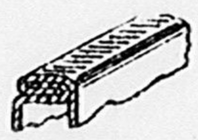


Fig. 12

Inventor
Louis H. Brinkman
By his Attorney
Thomas Howe

UNITED STATES PATENT OFFICE.

LOUIS H. BRINKMAN, OF GLEN RIDGE, NEW JERSEY, ASSIGNOR TO TITEFLEX METAL HOSE CORPORATION, A CORPORATION OF NEW YORK.

FLEXIBLE TUBE.

1,198,392. Specification of Letters Patent. **Patented Sept. 12, 1916.**

Application filed September 7, 1915. Serial No. 49,258.

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To all whom it may concern:

Be it known that I, Louis H. Brinkman, a citizen of the United States, and resident of Glen Ridge, in the county of Essex and State of New Jersey, have invented a certain new and useful Flexible Tube, of which the following is a specification.

This invention relates to flexible tubes.

More particularly the invention relates to a flexible tube formed from a metal strip or ribbon.

Flexible tubes of the character to which this invention relates are adapted to a wide variety of uses such, for instance, as water pipes, steam pipes and pipes for other fluids, conduits for electric wires, etc. In fact such tubes will be found of use in all applications where a pipe or a conduit would be used. Where the improved flexible tube is employed, elbows and other jointing devices at turning points are unnecessary and, generally speaking, the improved tubes are readily adaptable to such forms as may be required under different circumstances of installation without additional parts or special construction. The tubes may also serve as radiators or heat radiating conduits, by making the groove between the convolutions open to a greater or lesser extent to facilitate or retard the radiation as may be desired.

It has been proposed to manufacture flexible tubing from a strip or ribbon, but so far as I am aware, all of such proposals necessarily involve disadvantages in their manufacture or operation. Among these disadvantages may be mentioned sliding at the joints necessary to produce flexibility, (and this requires packing to make a fluid tight joint), the requirement of heat in manufacture and numerous other objections exist, not only as to the manufacture and efficiency but as to the extent of life of the tube.

The improved tube forming the subject matter of this invention is formed of a helically disposed ribbon or strip having the edges of adjacent convolutions interfolded and a bent section, preferably in the form of a groove, extending longitudinally of the strip. The manner of connecting the convolution edges by interfolding lends itself readily to processes of manufacture and a fluid tight joint can be attained by firmly compressing the interfolded parts together. The making of a fixed fluid tight joint as described, however, would substantially destroy the flexibility of the tube except that such flexibility is provided by the longitudinal groove. Even where it is not necessary to make the joint fluid tight and fixed, the groove enhances the flexibility and contributes to the ready manipulation of the tube for the various purposes to which it may be applied. The flexibility and other characteristics of the tube are improved if the sides of the groove are reflexed with relation to the bottom; also the mechanical characteristics of the tube are improved and its interior is smoother and presents less obstruction to the fishing of wires and the like if the interfolded edges are placed at the outside of the tube; also it is preferred to have the bottom of the groove thicker than the sides thereof, the latter tapering off from the bottom so that the whole will be strengthened and, upon flexing of the tube, no undue bending moment will come upon any particular section.

Other and ancillary objects of the invention will appear hereinafter.

The accompanying drawings illustrate an apparatus whereby the improved tube may be formed and also the improved tube itself in several modifications.

Figure 1 is a side elevation of a machine whereby the tube of this invention may be manufactured, some of the extremities being omitted so as to bring the illustration properly within the compass of the sheet and which will be readily understood from the description, with some parts in section. Fig. 2 is a section on a reduced scale through the frame and headstock spindles on the line 2—2 of Fig. 1, looking in the direction of the arrow, the clutch and clutch shifting members being shown in elevation. Fig. 3 is an end elevation, on an enlarged scale, of the tube forming nut or die and its appurtenant apparatus. Fig. 4 is a top plan view of the same. Fig. 5 is an end view of the preliminary strip former feeding the strip into the forming threads of the die and screw, the view being of the end nearest the die and the strip emerging from the former being shown in section. Fig. 6 is a section on the line 6—6 of Fig. 4, looking in the direction of the arrows, and Fig. 7 is a still further enlarged sectional view of the tube and that portion of the nut immediately involved in its formation, showing more clearly the details of construction of the tube and of its formation by the die and screw. Figs. 8 to 12 inclusive are fragmentary views and illustrate modifications.

Referring to the drawings, the apparatus comprises a support or frame A upon which is mounted a headstock comprising the rotatably mounted spindle B, the reversible driving mechanism C therefor and the chuck D. Within the chuck is secured a screw-rod E carrying a screw thread which coöperates with a longitudinally movable nut F to form the tube. Also the screw rod has a thread engaging with a longitudinally moving nut G for appropriately reversing the direction of rotation of the rod.

Referring to the drawings more in detail, the spindle B of the headstock is supported in the bearings 1 and 2 and rotatably mounted upon it are the belt pulleys 3 and 4 upon which run the belts 5 and 6 driven in opposite directions by any suitable source or sources of power. Splined upon the spindle is a movable clutch member 7 which may be slid longitudinally to alternately engage the pulleys 3 and 4.

In order to shift the movable clutch member to reverse the direction of rotation of the chuck and screw rod, and to securely hold it in the position to which it may be moved, the clutch member has extending laterally from it two trunnions 8 and 9 which are embraced by the forks 10 and 11 at the ends of a yoke journaled in the frame. The yoke comprises a sleeve 13 to the ends of which the arms 14 and 15, carrying the forks 10 and 11, are fixed. The yoke is held in position to cause driving engagement with one of the pulleys 3 or 4 by an off-center spring 16 having one end secured at 15′ to an extension of the arm 14, and the other end to a suitable stationary point. To move the yoke, the arms 17 and 18 are fixed upon a shaft 19 which passes through and is rotatable in the sleeve 13. The arm 17 is provided with a disk 20 having a slot 21 which receives a pin 22 fixed to the extension of the arm 14 of the yoke. An off-center spring 23 has one end connected to the arm 18 at 24 and has its other end secured to a fixed point. The pin 22 and slot 21 provide a connection which permits movement of the arms 17 and 18 with relation to the yoke until the spring 23 has passed center. The arms and yoke are then thrown together quickly into the position for reverse rotation, the spring 23 being stronger than the spring 16. The spring 16 serves to hold the clutch in closed position during transition movements of the shifting mechanism. The arm 17 is moved in one direction or the other by means of a link 25 which is pivoted to the arm at 25′ and is connected with the nut G by a pin 26 and slot 27. The slot permits quick movement of the arm 17 after its spring has passed dead center. A similarly connected link 28 extends between the arm 18 and the nut G upon the other side. Forward and backward movement of the nut G along the rod E operates to throw the clutch member from one extreme to the other so that the direction of rotation of the spindle, chuck and screw rod is reversed at regular intervals for a purpose as will hereinafter appear.

The parts directly concerned in the formation of the tube comprise the nut F coöperating with the threads 28′ on the screw rod together with appurtenant appliances. The nut comprises a steel casing 29 having a central bore adapted to receive a steel die 30 and a brass bushing 31 closely fitting against it, the die and bushing being held in position and prevented from movement with relation to the casing by means of set screws 32 and 33 as shown. It will be observed that the bore just spoken of does not extend entirely through the casing but that there is a smaller bore at one end so that the flange 34 is formed against which the die abuts. The diameter of the bore inside this flange is such as to allow the passage of the tube as formed by the die and screw. The bushing 31 may be threaded to receive the rotating screw threads with a running clearance as shown, and the steel die may have certain non-forming threads, as 35, 36, 37, etc., and it carries specially formed threads 38, 39, and 40 adapted to form the strip into the tube. After the tube forming threads have been passed the die has an unthreaded interior surface.

To permit the strip of which the tube is formed to be fed into the die from the side, the casing 29 and the die have segments cut away as shown particularly in Figs. 3 and 4, forming a recess having side walls 41 and 42 and an end wall 43. Secured to the wall 42 of the recess is a channel or former 45′ for preliminarily shaping the ribbon prior to its introduction into the die. This former is flat at one end where it receives the flat ribbon 44 and at its other end is shaped as shown in Fig. 5. It will be observed that this former initiates a longitudinal groove 45 in the strip and one edge is curled over as shown at 46. The ribbon passes from the former 45′ into the die, the bottom portion of the groove being between the top of the die thread 40 and the screw at the base of the screw threads. The sides 47 and 48 extend up on both sides of the die thread 40. The side 48 is bent to have a right angled section in conformity to the outline of the die thread 40 and has its extremity 50 bent into a radial position in a slot cut in the die at the base of the thread. The width of this slot is such as to be substantially equal to

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the thickness of the ribbon or strip of which the tube is formed. Similar clearances are formed between the screw and the die at the base of the die thread at 51 and also about the die thread 40 except that at the outer face of the die thread the clearance is made larger and the adjacent ends of the clearances at the sides of the thread are made larger, gradually tapering off to clearances at the base of the die thread which are substantially equal to the thickness of the ribbon. This increased clearance at the inner face of the die thread and at the sides as described, provides space for the swaging or thickening of the metal which takes place. This thickening of the bottom of the groove in the strip is of advantage as will be hereinafter again referred to. The curled over edge of the side 47 is entered within a channel 52 at the base of the die thread 40. This channel is of slightly more than the width of three thicknesses of ribbon at the start. The curled over portion received from the preliminary former is more sharply bent on entering the channel and consequently its tendency is to spring against the sides of the channel, leaving a clearance for one thickness of the ribbon between the sides of the bent over portion. Within this clearance is entered the radial edge 53 of the preceding convolution, this edge corresponding to the edge 50 of the convolution being considered. The strip maintains this sectional shape following the die thread 40 about the screw, except that the channel 52 is narrowed as it progresses about the screw so that the bent over edge of the strip and its embraced radial edge of the next convolution are pressed more closely together as shown at 54. The strip then emerges from the die into the recess and reënters the die about the die thread 39. The right hand radial side (as viewed in Figs. 6 and 7) is now embraced by the curled over portion of the edge of the succeeding convolution and its left hand edge, interfolded with the preceding convolution will enter within a channel 56 cut in the die at the thread base. This channel is formed at its beginning of a section as shown at 56 with an inclined wall which bends over the interfolded edges to one side. This section is gradually merged into the section as shown at 57 as it progresses about the die until the interlocked portions are bent down and occupy the position as shown at 57, the clearance between the die and thread being substantially equal to four thicknesses of the ribbon. In this condition the joined edges of the strip emerge from the die into the recess and are entered into a similarly shaped clearance 58 of similar depth between the die and screw threads. The joint may be then passed around the screw one or more times without changing form and the tube emerges from the nut having the sides of the groove in the strip substantially radial of the tube, the bottom of the groove upon the inside of the tube and the interfolded edges of contiguous convolutions of the strip at the outside of the tube, the section of the tube being then as shown at 59 and exterior elevation as at 59′. The tube then passes on between the grooved rollers 60 and 61 which bear upon the joint and bring the parts firmly together so as to insure a tight and shapely joint in case such has not been already accomplished. It will be observed that the rollers are set in a plane which makes an angle with the longitudinal axis of the tube corresponding to the helical pitch of the strip so that the rollers are adapted to the helical form of the joint. The rollers may conveniently be rotatably mounted upon arms 62 and 63 pivoted to the end of the casing of the nut at 64 and 65. These arms are engaged by the ends of a spring 66 which tends to throw them away from the tube, the spring being secured to the end of the nut casing at its center 67. The rollers are forced against the tube by means of a screw 68 tapped into the tail 69 of one of the arms 62 and bearing against the tail 70 of the other arm 63. Obviously by turning this screw in one direction or the other the pressure of the rollers upon the tube may be adjusted as desired. A lock nut 71 on the screw provides for securing the arms and rollers in adjusted position. As the rollers bear against opposite sides of the tube they have no tendency to bend it to one side or the other.

The nut F as described, is secured to a stand or support 72 sliding upon the frame. This may be done by means of machine screws 73 passing through the head 74 and tapped into the nut casing, the casing being tapped for this purpose at 75, 76, etc. The head 74 has a central opening to permit the passage of the screw E. It will be observed that between the rollers and the end of the die threads there are several convolutions of the thread on the screw which have no corresponding threads on the die or nut casing, the die and casing presenting plain faces 78 and 79 to the screw threads.

It will now be apparent that the strip having been entered between the die and screw as indicated, the turning of the screw will frictionally grip the strip and draw it into the die so that a tube will be formed as described. The turning of the screw, however, causes the nut F to travel along the screw member, and unless the tube sections to be formed were very short, the apparatus would have to be very long to accommodate the travel of the nut. For this reason provision is made for returning the nut to its starting point at suitable intervals. This is the object of reversing the direction of rotation of the screw member as before referred to. In the case shown the forming thread on the screw member is a right hand thread, as is also the thread 80 for the nut G. As, therefore, the screw member is rotated in a clockwise direction, viewed from the headstock, the strip will be drawn in and the tube formed as described, the forming nut moving toward the head stock and the shifting nut G moving in the same direction. As the nut G moves back and forth it shifts the clutch as has been referred to.

The operation of the apparatus in its entirety may now be traced.

The end of the metal is entered in the former 45′ in which it has a groove initiated and one edge curled over as described. From the former it is entered within the die or nut at the first forming thread as described and, the screw being turned, the strip is passed through the forming threads of the die and on about the screw under the grooved rollers 62 and 63 when the tube emerges from the nut. As it enters the rollers it is of a longitudinal section as shown at 59. In passing through the forming channels, it will be observed that the clearances are such as to force the interfolded edges tightly together and the folding of one part about the other draws them tightly together at the bends so that a fixed tight joint is formed. The form as shown in section at 59 may be the final form, and for some purposes may be best, but the tube may be compressed or reflexed later into a form, section of which is shown at 96. The exterior view of the tube is shown at 97.

Let it be assumed that the flat strip has been passed through forming channels of the die and further that the apparatus is in the phase of operation as indicated in Fig. 1. In this position the apparatus has just completed a tube forming period, the nut G is substantially at the extremity of its left hand movement (see Fig. 1) and the forming nut F is substantially at the left hand extremity of its movement. The driving clutch has been thrown to the left into engagement with the pulley 3 so that the belt 5 driving the pulley in a counterclockwise direction, viewed from the left hand end, turns the screw rod in a similar direction. This will result in the withdrawal of the screw from the nut and from the tube or strip, the latter being backed off sufficiently to release the torsional gripping between it and the screw. The nut F then moves toward the right carrying with it the strip and tube, there being no turning of the latter in this movement. During this operation, the shifting nut G is also carried to the right. At a certain point in its travel, depending upon the adjustment, the clutch member operating levers are moved past center and the clutch member is thrown to the right into engagement with the pulley 4. It will be apparent that the arrangement of levers and off-center springs is such that the shifting of the clutch is brought about practically instantaneously so that there is no material discontinuance of the operation. The pulley 4 revolving in the opposite direction from that of the pulley 3, the direction of rotation of the screw will now be reversed. As the screw thus turns, the strip will be held to it by a torsional frictional grip so that it turns with the screw, the sufficiency of this frictional grip being insured by the extra turns of the strip about the screw in addition to those turns under the forming threads. The drawing of the strip in and through the nut operates to form a groove longitudinally of the strip, winds the strip into a helical form and interfolds the edges of adjacent convolutions, forcing these edges tightly together so that a fixed and fluid tight joint is formed. The tube then passes on under the rollers 60 and 61 as before described. During this operation, it being observed that the screw does not move longitudinally, the forming nut moves to the left (see Fig. 1) the screw and strip turning within it. This is kept up as long as the screw is turned in the direction indicated. During the left hand travel of the forming nut the shifting nut G is carried to the left until, at a certain predetermined point, the driving clutch is again shifted to the position shown in the drawings. The parts of the machine will then occupy positions as shown in Fig. 1 and a cycle of operation has been completed and may be repeated indefinitely as long as it may be desired to operate the machine.

The tube, of section as shown at 59, as it is delivered by the forming nut and screw may be used as it is but if desired it may be compressed axially by passing a rod through it, the rod having nuts at the ends of the tube. Pressure is then brought to bear on the ends of the tube by turning the nuts and the tube may thus be compressed longitudinally. The grooved walls may thus be reflexed and the tube formed to have a longitudinal section as shown at 96 and an exterior as shown at 97. Also the tube might be compressed in a hydraulic press or in other suitable ways.

It will be observed that in the tube as shown at 59 and also as shown at 95, the interfolded parts forming the joints between the convolutions positively engage with each other so that they are held against relative movement either radially or longitudinally of the tube. It will be seen that the extreme edge of each convolution extends to and abuts against the bottom of the fold of the adjacent convolution, there being no clearance, so that the interfolded parts are positively held against movement with relation to each other longitudinally of the tube. Also, the parts interfolded together being pressed closely together radially of the tube, they positively engage each other to prevent relative movement in a radial direction. The result of the positive engagement is that the parts are held permanently immovable with relation to each other. They are relatively immovable under all conditions; only upon destruction of the tube can movement take place. The term "positive" is here used in the same sense which it would ordinarily convey in mechanics. It means that the engagement is a rigid connection unavoidable except upon breakage or abnormal distortion of the parts as distinguished from the well known non-positive engagements such as frictional engagements.

Fig. 8 illustrates a fragment of a tube section wherein the interfolded strip-edges are not bent down to one side of the helical meeting line of the convolutions.

Fig. 9 illustrates a tube section fragment wherein a second strip 98 wound helically about the tube has its edges bent to interlock with grooves 99 and 100 in the tube strip. This subsidiary strip reinforces the tube against longitudinal expansion or extension. Another arrangement for this purpose is shown in Fig. 10, wherein adjacent convolutions are interlocked, the bottom of the groove at one side having a hook 101 and an oppositely extending hook at the other side so that the opposed hooks of adjacent convolutions are adapted to interlock as shown. In the structure as illustrated in Fig. 11, the tube is reinforced by a wire 102 wound inside the tube between the convolutions.

To more securely hold together the folded edges of the strip forming the tube, the joint may have indentations made upon it as shown in Fig. 12.

While the invention is illustrated in what are considered its best applications, and a preferred form of apparatus for making it has been shown, the invention may have other embodiments and be produced by other apparatus. It is not therefore limited to the structures, or to manufacture by the apparatus, shown in the drawings.

What I claim is:

1. A flexible tube comprising a helical strip having edges of adjacent convolutions interfolded, said strip having a longitudinal fold or groove, and the parts interfolded together having positive engagement with each other holding them permanently from relative movement longitudinally and radially of the tube.

2. A flexible tube comprising a helical strip having edges of adjacent convolutions interfolded and said strip having a longitudinal fold or groove, the said interfolded edges being at the outermost portion of the wall of the tube.

3. A flexible tube comprising a helical strip having edges of adjacent convolutions interfolded, said strip having a longitudinal fold or groove, the bight of the groove being thicker than its sides.

4. A flexible tube comprising a helical strip having edges of adjacent convolutions interfolded, said strip having a longitudinal fold or groove with its sides reflexed with relation to its bottom.

5. A flexible tube comprising a helical strip having edges of adjacent convolutions interfolded in fixed relation and forming a fluid tight joint, said strip having a longitudinal fold or groove, the bight of said groove being thicker than its sides, said sides being reflexed with relation to its bottom, the said interfolded edges being at the outermost portion of the wall of the tube and the bottom of the groove being at the innermost portion of the wall of the tube.

6. A flexible tube comprising a helical strip having edges of adjacent convolutions interfolded, said strip being bent transversely to provide flexibility, and the parts interfolded together having positive engagement with each other holding them permanently from relative movement longitudinally and radially of the tube.

7. A flexible tube comprising a helical strip having a longitudinal groove and edges of adjacent convolutions interfolded at the outermost portion of the wall of the tube and bent to one side of the substantially helical line at which the convolutions meet.

8. A flexible tube comprising a helical strip having edges of adjacent convolutions interfolded, said strip having a longitudinal fold or groove, and the parts interfolded together having the extremity of the edge of one convolution extending to the bottom of the fold in the other convolution, there being no clearance between the said extremity and the bottom of the fold against which it abuts, forming a positive engagement holding the interfolded parts permanently against relative movement of the parts longitudinally of the tube, said interfolded parts being pressed together radially of the tube, there being no clearance between them radially of the tube, forming a positive engagement holding the interfolded parts permanently against relative movement radially of the tube.

Signed at New York in the county of New York and State of New York this 4th day of September, A. D. 1915.

LOUIS H. BRINKMAN.

(No Model.)

R. KELSO & M. ROSENBAUM.

FLEXIBLE METALLIC SHEATHING FOR TUBES AND ROPES.

No. 606,557. Patented June 28, 1898

FIG. 1.

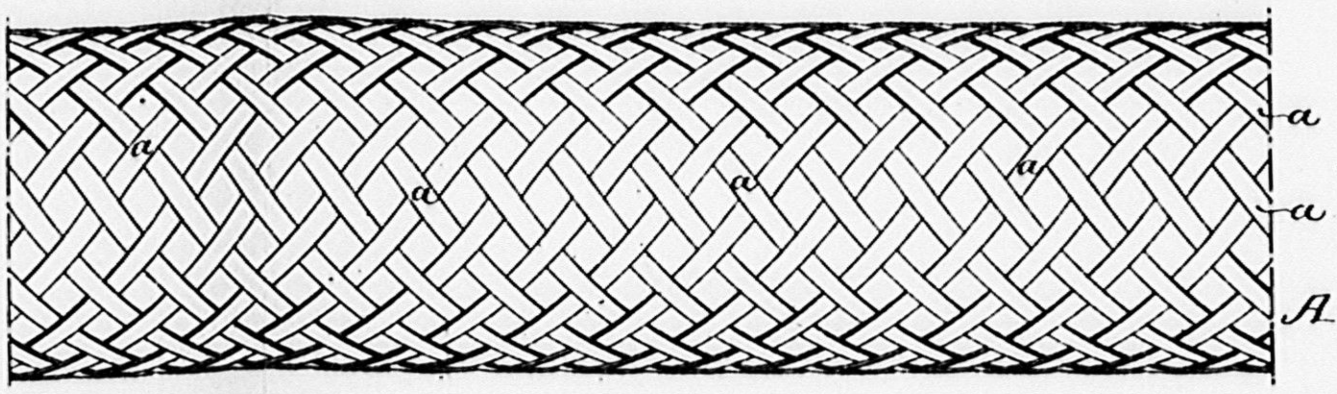


FIG. 2.

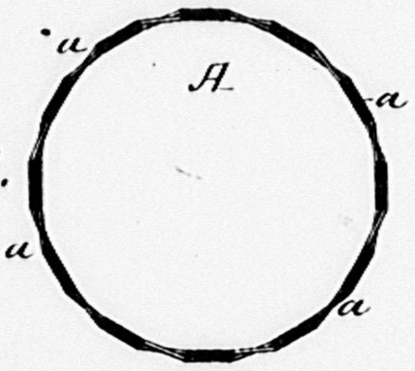


FIG. 3.

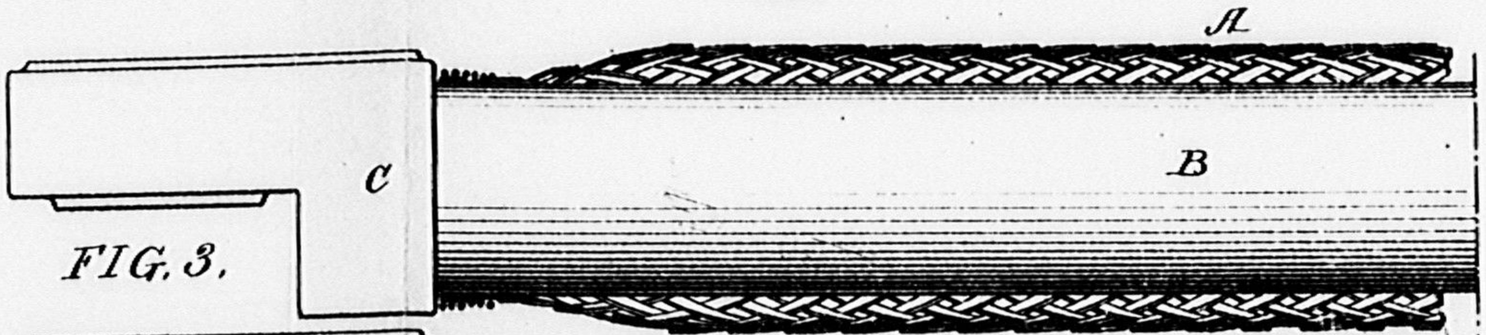


FIG. 4.

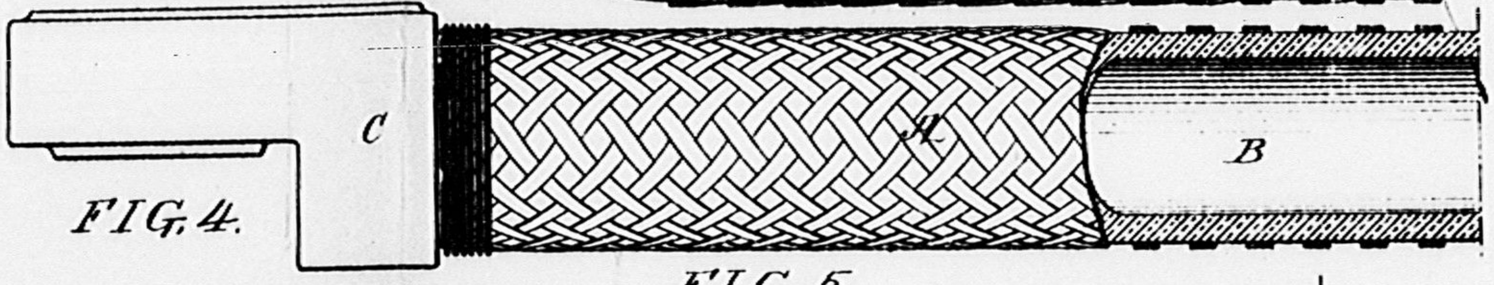


FIG. 5.

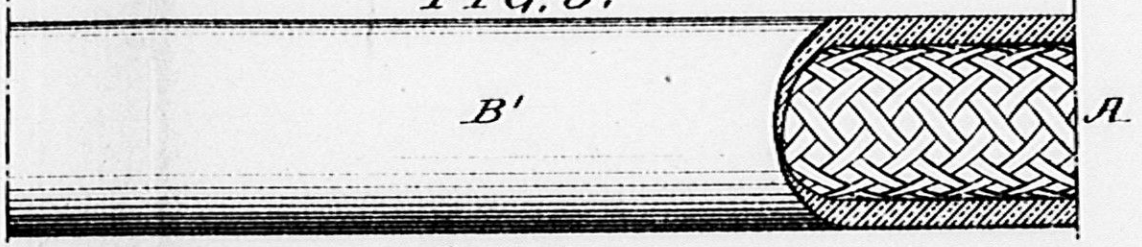


FIG. 6.

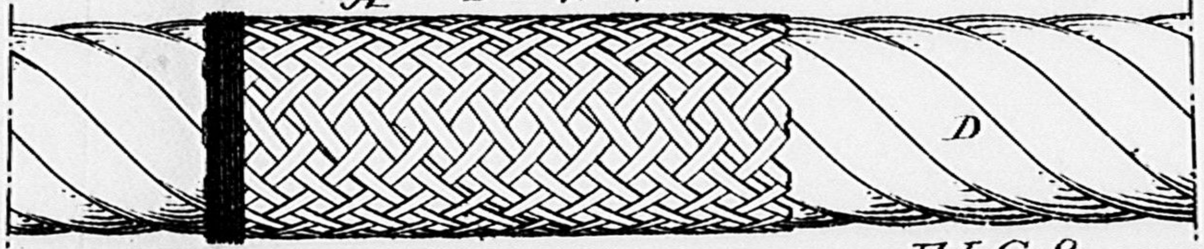


FIG. 7.

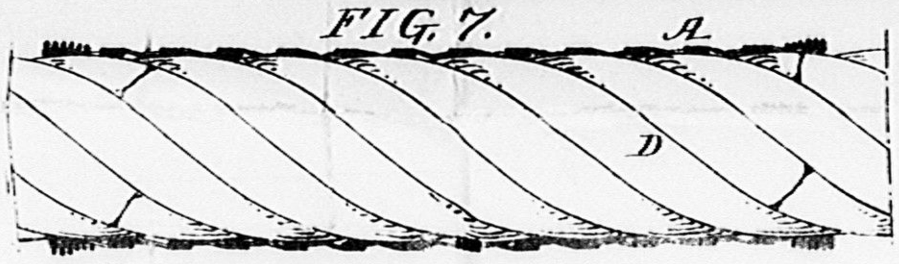
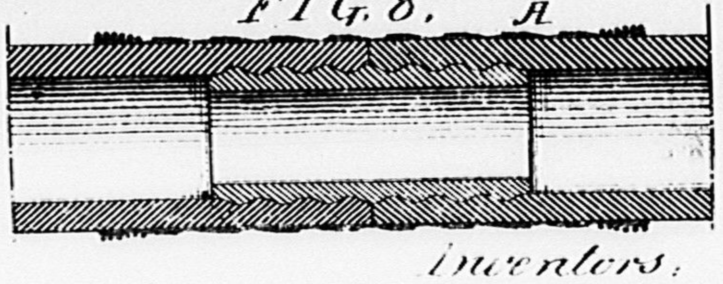


FIG. 8.



Witnesses:
Hamilton D. Turner
Will. A. Barr.

Inventors:
Robert Kelso and Morris Rosenbaum
by their Attorneys
Howson & Howson

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from the original bound volume

UNITED STATES PATENT OFFICE.

ROBERT KELSO AND MORRIS ROSENBAUM, OF PHILADELPHIA, PENNSYLVANIA.

FLEXIBLE METALLIC SHEATHING FOR TUBES AND ROPES.

SPECIFICATION forming part of Letters Patent No. 606,557, dated June 28, 1898.

Application filed November 22, 1897. Serial No. 659,469. (No model.) Patented in Austria March 29, 1897, No. 47/1,548; in Belgium April 1, 1897, No. 127,330; in France May 29, 1897, No. 267,417, and in Canada August 14, 1897, No. 57,045.

To all whom it may concern:

Be it known that we, ROBERT KELSO and MORRIS ROSENBAUM, citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Flexible Metallic Sheathing for Tubes, Ropes, &c., (for which we have obtained Letters Patent in Canada, No. 57,045, dated August 14, 1897; in Austria, No. 47/1,548, dated March 29, 1897; in France, No. 267,417, dated May 29, 1897, and in Belgium, No. 127,330, dated April 1, 1897,) of which the following is a specification.

The object of our invention is to provide a flexible metallic sheathing or casing for flexible tubes, &c., in order to increase the strength of the article incased either against tensile strains in the case of tubes or ropes, against lateral pressure in tubes, against the collapsing of tubes when a vacuum is formed within the tubes, and against abrasion of tubes, ropes, &c.

A further object of our invention is to provide a coupling for ropes or tubes, as fully described hereinafter.

Referring to the accompanying drawings, Figure 1 is a view of our improved casing. Fig. 2 is a transverse sectional view. Fig. 3 is a view showing the method of applying the sheathing to the article to be incased. Fig. 4 is a view showing the casing applied to the outside of a rubber hose. Fig. 5 is a view showing the casing applied to the inside of a rubber hose. Fig. 6 is a view showing the casing applied to a rope. Fig. 7 is a view showing the method of applying the sheathing in splicing ropes so as to form a coupling. Fig. 8 is a view showing the sheathing applied as a tube-coupling.

In the manufacture of our improved casing A we take a number of ends of tempered flat steel wire *a*, preferably galvanized to prevent corrosion, and braid this wire to tubular form, as shown in Figs. 1 and 2, the mesh being determined during the process of braiding, and we preferably braid the tubes to be applied to objects from one-half an inch to three inches of one diameter, and by changing the pitch of the wires we may increase or diminish the size of the mesh. By placing a torsional strain on the tube after it is made the diameter will be decreased, and by placing a compressing strain on the end of the tube the diameter will be increased.

The article, as shown in Figs. 1 and 2, is itself a complete article of manufacture and is now sold by us to be applied to tubing, rope, &c., in any length required, and we usually wrap the sheathing upon reels holding one thousand feet, and this sheathing can be cut off in lengths as required.

To apply the sheathing A to a rubber or other hose B, we cut the sheathing the proper length, compress it longitudinally, so as to increase its diameter in order that it may be slipped readily over the hose to be incased, and after it is in position one end of the sheathing is secured to the hose or other tubing in any suitable manner, preferably by wrapping fine soft wire around the sheathing and tube, so as to tightly bind the sheathing to the tube, as shown in Fig. 3. The sheathing is then drawn down upon the hose, either through the hands or by means of a tool, so that its length will be increased, and consequently its diameter decreased, until it fits perfectly tight upon the hose, as shown in Fig. 4, after which the free end is secured to the end of the hose by a wire or other fastening in the same manner as the opposite end was secured. The sheathing is thus secured to the hose or other flexible article at separated points of attachment and is free to expand and contract between said points of attachment when the said article is bent.

Where an ordinary hose-coupling C is used, the clamp for securing the hose to the coupling may be applied over the sheathing, so as to hold the sheathing firmly to the tube and the tube to the coupling.

In incasing tubes with couplings attached—such, for instance, as the tubes of air-brake mechanism of railway-cars—all that is necessary is to longitudinally contract the sheathing, so that it will readily slip over the head of the coupling, as well as over the hose, after which it is fastened at one end and drawn out until it binds tightly upon the hose, and then fastened tightly at the opposite end either by a clamp or other means of fastening.

We have submitted hose incased with our improved sheathing to severe tests, and it has withstood pressures up to one thousand pounds to the square inch.

The flat wire presents a sufficient surface to prevent the cutting of the tube by the wire, and the braiding is open sufficiently to allow the tube the same free movement as if the sheathing was not applied. Furthermore, a tube with the casing applied will not buckle or kink and in time crack, as will the tube not provided with a casing.

In Fig. 5 we have shown the sheathing A applied to the inside of a tube B' instead of the outside where it is wished to resist atmospheric pressures, and in order to apply the sheathing to the tube we stretch the sheathing so that the diameter is less than the internal diameter of the tube. We then slip the sheathing into the tube and increase its diameter by longitudinal compression until it fits tightly against the tube, when it is fastened at each end.

Fig. 6 is a view illustrating the sheathing A applied to a rope D, and may be either applied to ordinary fiber rope or wire rope. By applying this sheathing to the rope we find that the strength is materially increased, the strands are confined closely together, thus preventing fraying, and, furthermore, when the rope is used in a winding-drum, for instance, the sheathing prevents chafing.

The sheathing being braided allows for the free contraction of the rope when wet and expansion of the rope when dry, and it will allow the rope to swell, yet will keep it taut at all times, the flat surface of the wire preventing cutting, the same as described above in connection with the rubber hose.

We may use the tube as a means of coupling together two pieces of rope or two sections of hose. For instance, as shown in Fig. 7, some of the strands of one section of rope may be cut back some distance from the end of the section and some of the strands of the other section may also be cut back of the end and the loose strands twisted together, so as to form a joint of an even diameter without resorting to the ordinary method of splicing. Previous to joining the ends of the rope together our improved sheathing is slipped over one section, so that when the sections are wrapped together by drawing the sheathing over the joint and pulling it out, so that it will bind tightly upon the rope, and securing it to the rope at the ends we are enabled to tightly bind the uncut strands of rope together, and the more strain that is placed upon the rope the tighter the strands will bind, so that we not only rely upon the tensile strength of the sheathing, but also upon its quality to hold the strands of rope in frictional contact.

Hose or tubing may be coupled in the manner shown in Fig. 8 by inserting in the ends of the two sections to be joined a tubular coupling-section, and by slipping a short section of our improved sheathing over the tubes at the joint and stretching it, so as to tightly grasp the tubes at the joint, we are enabled to make a joint that is strong and which will withstand more than the ordinary pressures.

It will be understood that if it is wished the tube with the sheathing may be inclosed in an outer casing of flexible material, although we have found that by galvanizing the wire corrosion is prevented and the inclosing casing may be dispensed with.

We prefer to use a flat wire, because it can be used without any such tendency to cut into the article to which it is applied as may in some cases exist where a round wire is used; but a round wire may be used in some cases, and it will be understood that we do not limit ourselves to a flat wire.

We claim as our invention—

1. The combination of a flexible article, such as a hose, rope, &c., a sheathing composed of a series of flat wires braided or interlaced, said sheathing being secured to the finished flexible article at separated points of attachment, and being free to expand and contract between said points of attachment when the flexible article is bent, substantially as described.

2. The combination of a finished tube, a sheathing made of a series of flat wires braided into the form of a tube, said sheathing being slipped over the finished tube so as to snugly fit thereon, with means for securing the wires forming the sheathing to the tube at separated points of attachment so that the wires will have free movement between the points of attachment when the tube is bent, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ROBERT KELSO.
MORRIS ROSENBAUM.

Witnesses:
CHAS. H. BANNARD,
WILL. A. BARR.

sides, of a strand outside the corrugations of said tube and bearing upon said corrugations, said strand being wound helically about said tube and connected to the ends of said tube.

2. The combination with a corrugated tube depending for its flexibility on relative movement of the corrugation sides, of strands helically wound about said tube in opposite directions, bearing against said corrugations and connected to the ends of said tube.

3. The combination with a flexible tube comprising a helically disposed strip having a central longitudinal groove forming a corrugation and having the adjacent edges of contiguous convolutions interfolded, said tube depending for flexibility on relative movement of the corrugation sides, of strands wound helically about said tube in opposite directions, bearing against said corrugations and connected to the ends of said tube.

4. The combination with a flexible corrugated tube formed of a helically disposed strip having a central longitudinal groove forming a corrugation and the adjacent edges of contiguous convolutions interfolded, said tube depending for flexibility upon relative movement of the corrugation sides, fittings secured to said tube at its ends, and strands helically wound about said tube in opposite directions bearing against said corrugations and secured to said fittings.

5. The combination with a corrugated tube depending for flexibility upon relative movement of the corrugation sides formed of a helical strip having the edges of adjacent convolutions in engagement, of means for preventing twisting of the said tube whereby tendency to cause sliding in the joint between adjacent convolutions is overcome.

The references relied upon by the Examiner are the patents to:

105 Brinkman, 1,198,392, Feb. 25, 1916, 137-75F.
Rudolph, 1,054,244, Feb. 25, 1913, 285-72.
Kelso 606,557, June 28, 1898, 137-90.
Smith, 762,954, June 21, 1904, 137-90.
Witzenmann, 993,934, May 30, 1911, 137-75F.
Witzenmann, 933,516, Sept. 7, 1909, 137-75F.
Witzenmann (French) 328,650 of 1903, 137-75F.

The alleged invention is a hose formed of two elements, the inner element, known as a Brinkman tube, is a flexible, corrugated metal tube which depends for its flexibility solely on the relative movement of the corrugation sides longitudinally of the tube. In order to insure the inner element against twisting a braided cover is applied since a braided covering has the property of being non-distortable. Such covering is flexible, however, by reason of being capable of longitudinal movement upon a change of diameter. The properties of this type of covering are described in more detail in the Kelso and Smith specifications.

The Brinkman patent shows a tube which is identical in construction to the tube in the present application while the Rudolph, Kelso, Smith and Witzenmann patents show braided coverings identical to applicant's covering. This is admitted by the applicant.

The claims are rejected on the Brinkman patent in view of either Rudolph, Kelso, Smith or Witzenmann. The secondary art shows the use of a braided metallic covering to protect an inner tube against distortion to be quite conventional. The braided covering of the secondary art performs the same function to the enclosed tube which applicant's covering does, that is, prevents distortion of the enclosed tube. When the covering of the secondary art is applied to the Brinkman tube, it exhibits no property or capacity not realized by one skilled in the art through operation of it in its known use. Consequently to fortify the Brinkman tube in the manner suggested by 106 the secondary art does not require the exercise of invention.

A. W. COWLES,
Examiner.

107 In the Supreme Court of the District of Columbia,

October Term, 1929

TITEFLEX METAL HOSE CO.

vs.

ROBERTSON, COMMISSIONER OF PATENTS

In Equity. No. 48467

Defendant's Exhibit D^2

108 U. S. Patent Office, Board of Appeals, Dec. 15, 1927, Mailed.

Appeal No. 1253, Paper No. 17.

NLH.

In the United States Patent Office, Before the Board of Appeals.

Appeal No. 1253.

Ex parte Louis H. Brinkman.

Application for Patent filed November 21, 1919. Serial No. 339,620. Tube.

Hearing Sept. 28, 1927.
Mr. Thomas Howe for applicant.

Decision

The applicant appeals from a final rejection of claims 1 to 5 inclusive. Claim 1 is reproduced for illustrative purposes:

1. The combination with a corrugated tube depending for its flexibility on relative movement of the corrugation sides, of a strand outside the corrugations of said tube and bearing upon said corrugations, said strand being wound helically about said tube and connected to the ends of said tube.

The references cited are:
Kelso et al., 606,557, June 28, 1898.
Smith, 762,954, June 21, 1904.

Witzenmann, 933,516, Sept. 7, 1909.
Witzenmann, 993,934, May 30, 1911.
Rudolph, 1,054,244, Feb. 25, 1913.
Brinkman, 1,198,392, Sept. 12, 1916.
Witzenmann, *Fr.*, 328,650, of 1903.

What appellant is claiming is an inner corrugated tube reinforced by a braided covering. The inner tube is
109 disclosed in appellant's prior patent No. 1,198,392 while the remaining references show inner tubes, some of them formed of helically coiled wire reinforced by a braided covering. The statement on appeal calls attention to the fact that some of the secondary or supplementary references, particularly the patents to Kelso et al. and Smith, describe the characteristics of the braided outer tube which render it useful as a covering for a helically formed inner tube. It is the view of the examiner that it did not involve invention to apply to the old Brinkman tube, the equally old braided covering of the other references.

The appellant urges that there is a special cooperation between the Brinkman tube and the braided covering therefor and that by bringing together the two elements a new combination is produced. It is true that appellant's complete tube is not disclosed in any single reference but it seems to us that if one using the Brinkman tube found that it yielded too readily to forces tending to distort it the remedy was obvious and was taught by such references as Rudolph, Kelso et al. Smith or the Witzenmann patents. We think the appealed claims do not represent patentable invention.

The decision of the examiner is affirmed.

Limit of Appeal to Court of Appeals, forty days. Rule 149.

M. J. MOORE,
Assistant Commissioner,
E. S. HENRY,
Examiner-in-Chief,
W. S. RUCKMAN,
Examiner-in-Chief,
Board of Appeals.

December 15, 1927.

110 [Endorsed:] In the Supreme Court of the District of Columbia. October term 1929. Titeflex Metal Hose Co. vs. Robertson, Commissioner of Patents. In Equity No. 48467. Defendants Exhibit D 3.

Indorsed on cover: District of Columbia Supreme Court. No. 5307. The Titeflex Metal Hose Co., appellant, vs. Thomas E. Robertson, Commissioner, &c. Court of Appeals, District of Columbia. Filed Oct. 15, 1930. Henry W. Hodges, Clerk.

FOR MR. JUSTICE VAN ORSDEL

COURT OF APPEALS,
DISTRICT OF COLUMBIA
FILED
FEB 28 1931
Henry W. Hodges
CLERK

Court of Appeals of the District of Columbia

OCTOBER TERM, 1930.

No. 5307.

THE TITEFLEX METAL HOSE CO.,
Appellant,

vs.

THOMAS E. ROBERTSON, Commissioner of Patents of the United States

APPEAL FROM THE SUPREME COURT OF THE DISTRICT OF COLUMBIA.

BRIEF ON BEHALF OF APPELLANT THE TITEFLEX METAL HOSE CO.

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New York, N. Y.

ROBERT WATSON,
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Washington, D. C.
Of Counsel.

THE BALLOU PRESS NEW YORK

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Court of Appeals of the District of Columbia.

OCTOBER TERM, 1930.

THE TITEFLEX METAL HOSE CO.,
Appellant,
vs.
THOMAS E. ROBERTSON, Commissioner of Patents of the United States.

No. 5307.

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BRIEF ON BEHALF OF APPELLANT THE TITEFLEX METAL HOSE CO.

Statement of the Case.

This case comes before this Court on appeal from a decree, *without opinion*, of the Supreme Court of the District of Columbia dismissing a bill in equity filed under R. S. 4915 (35 U. S. C. A. § 63) seeking an adjudication that the plaintiff-appellant is entitled to a patent which had been refused by the Commissioner of Patents.

The application was filed in the Patent Office by the inventor, Louis H. Brinkman, for a patent upon a flexible tube. Such application was given Serial Number 339,620, and was filed on the 21st day of November, 1919. The Patent Office Examiner before whom the application came in the first instance refused to grant the patent upon the ground that

Court of Appeals of the District of Columbia.

OCTOBER TERM, 1930.

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The application was filed in the Patent Office by the inventor, Louis H. Brinkman, for a patent upon a flexible tube. Such application was given Serial Number 339,620, and was filed on the 21st day of November, 1919. The Patent Office Examiner before whom the application came in the first instance refused to grant the patent upon the ground that the device upon which a patent is sought, although new, did not involve "invention" in view of certain prior patents, whereupon an appeal was taken to the Board of Appeals of the Patent Office which affirmed such refusal. There was then open to the applicant one of two courses: an appeal upon the record made in the Patent Office, from the decision of the Board of Appeals to this court (jurisdiction in such cases having since been transferred to the United States Court of Customs and Patent Appeals), or the bringing of a bill in equity against the Commissioner of Patents under the provisions of R. S. 4915 as amended March 2, 1927. In this situation the Titeflex Metal Hose Co., the assignee of the inventor Brinkman, and the plaintiff herein, chose to file its bill in equity. This choice was made mainly because the Patent Office has no provision for introducing testimony by which the actual facts surrounding the invention could be brought out, but must rely upon its own impressions of the prior patents and other documents in the case without the aid of testimony by those conversant with the actual facts surrounding the invention. Such testimony is peculiarly valuable in a case such as the present, in connection with the solution of the difficult question of whether or not invention (as distinguished from the skill of the ordinary mechanic) was involved in the production of the alleged invention. The Patent Office refused the patent upon the ground that although the article claimed was new, its construction did not involve "invention" over what had been done before. Much light is thrown upon this question by testimony of witnesses concerning the actual facts surrounding the invention, and consequently bringing this suit instead of appealing from the Patent Office to this court, upon the mere paper records of the Patent Office (without any light on the subject from those actually conversant with the situation) was deemed more desirable.

All of the necessary jurisdictional and other matters, including the title to the invention in the present plaintiff, are alleged in the bill and admitted by defendant in his answer, except that the defendant denies that any invention was involved in the production of the device claimed, such device being set forth in the claims which are set out at length in the bill of complaint and hereinafter.

The sole issue in this suit therefor, is whether or not "invention" was involved in producing the admittedly new device upon which a patent is sought.

The present suit is a plenary and original suit in equity and is not in any sense an appeal from the Patent Office.

> *In re Hien,* 166 U. S. 432; 41 L. Ed. 1066;
> *Butterworth* v. *U. S.,* 112 U. S. 50; 28 L. Ed. 656;
> *Gandy* v. *Marble,* 122 U. S. 432; 30 L. Ed. 1223.

A new record has therefore been made which is different from the paper record upon which the Patent Office decision was based. This difference consists in the testimony of the witnesses in this case which the Patent Office did not (and could not) have the benefit of for the reason that the Patent Office provides no machinery for adducing testimony in such cases.

Assignment of Errors.

The assignment of errors is embodied in eight counts, reading as follows:

> 1. In decreeing that the bill of complaint be dismissed, whereas the Court should not have dismissed the bill of complaint.
>
> 2. In decreeing that the bill of complaint be dismissed, whereas the Court should have granted the prayer of the bill of complaint.
>
> 3. In decreeing that the bill of complaint be dismissed whereas the Court should have adjudged that the plaintiff is entitled according to law to secure its patent for the said improvements or inventions as stated in claim 1 recited in paragraph V of the bill of complaint.

4. In decreeing that the bill of complaint be dismissed whereas the court should have adjudged that the plaintiff is entitled according to law to secure its patent for the said improvements or invention as stated in claim 2 recited in paragraph V of the bill of complaint.

5. In decreeing that the bill of complaint be dismissed whereas the Court should have adjudged that the plaintiff is entitled according to law to secure its patent for the said improvements or inventions as stated in claim 3 recited in paragraph V of the bill of complaint.

6. In decreeing that the bill of complaint be dismissed whereas the Court below should have adjudged that the plaintiff is entitled according to law to secure its patent for the said improvements or inventions as stated in claim 4 recited in paragraph V of the bill of complaint.

7. In decreeing that the bill of complaint be dismissed whereas the Court should have adjudged that the plaintiff is entitled according to law to secure its patent for the said improvements or inventions as stated in claim 5 recited in paragraph V of the bill of complaint.

8. In decreeing that the bill of complaint be dismissed whereas the Court should have adjudged that the plaintiff is entitled according to law to secure its patent for the said improvements or inventions as stated in each and all of the five claims (1 to 5, inclusive) recited in paragraph V of the bill of complaint.

Points Relied on by Appellant.

(1) The combination forming the subject matter as set forth in the claims in issue is new. It is not found in the prior art which shows only the individual elements in different structures.

This was recognized by all the Patent Office tribunals before whom the matter has come, and all the prior art here set up was before those tribunals. No other matters have been introduced by Defendant herein than were before the Patent Office.

The trial Court rendered no opinion but simply made a decree dismissing the bill.

(2) The combination forming the subject matter of the claims in issue involves "invention" in view of the following considerations which appear of record in this case but which, for the most part were not before the Patent Office.

(a) The combination is not disclosed nor hinted at in the prior art.

(b) Neither the problems solved by the present combination nor their solution are indicated in any way in the prior art.

(c) The solution of the problems was unsuccessfully sought in various ways by engineers.

(d) When the solution afforded by the present invention was proposed it was thought to be unworkable by persons skilled in the art, but was found upon test to be a practical solution of the problems.

(e) The tube embodying the invention here in issue has gone into extremely wide commercial use and has substantially superseded the tube without the improvement of the present invention.

Considerations (b) to (e), inclusive, were made to appear herein by the testimony of witnesses which testimony was not and could not be placed before the Patent Office.

The trial Court rendered no opinion.

The Proofs.

The defendant-appellee has herein confined his proofs to the offering in evidence of four prior patents, which were before the Patent Office, and the decisions of the Primary Examiner and the Board of Appeals. The case here against patentability is therefor the same as it was in the Patent Office.

Plaintiff-appellant has offered in evidence the application for patent as the basis upon which adjudication in this case is asked and also has examined two witnesses. One of these witnesses, Mr. William H. Fulton, is a graduate engineer of the Massachusetts Institute of Technology and has since been engaged with manufacturing concerns where he has had to deal with piping or tubing which is the art to which the invention here involved belongs (Fulton testimony, p. 14, Appeal Record). Mr. Fulton was chief engineer of the Titeflex Metal Hose Co. at the time the present invention was produced for that company by the inventor, Mr. Brinkman (although he is not now with that company), and had direct charge of the manufacture of their tube. He testifies to facts surrounding the invention showing need for it, the difficulties encountered in the endeavors to solve the problem presented, and the lack of obviousness of the invention including the belief on the part of those concerned that the solution proposed by Mr. Brinkman would not work, but that tests showed its success (pp. 14 to 21, inclusive, Appeal Record).

The other witness was Mr. R. Harry Stone, Vice-President and General Manager of the Titeflex Metal Hose Co., the plaintiff herein, who testified as to the large commercial success of the flexible tubes embodying the invention and that such tube had superseded that which preceded it (pp. 22 and 23, Appeal Record).

Mr. Fulton also testified as to the bearing of the disclosures of certain prior patents introduced in evidence by the defendant upon the invention here involved (pp. 23 to 28, Appeal Record). This testimony has not been contradicted or modified in any way.

The Invention Involved.

The device upon which a patent is here sought, as set forth in the patent application (Pltf.'s Ex. No. 1, pp. 33 to 36 and p. 86, Appeal Record), is a flexible hose or tube which comprises an inner corrugated metal tube upon the outside of which and bearing directly against it are metal strips which are wound helically about the tube, some in one direction and some in the other, such strips being preferably interwoven with each other so as to present a more finished and compact appearance. The ends of the metal tube and of the strips are secured together usually by means of a coupling, to which both the strips and the tube are secured by soldering or in other appropriate ways, this coupling also serving the purpose of connecting the end of the hose with an outlet or another pipe, etc.

The inner corrugated tube is formed of a metal strip or ribbon which is coiled into a helix or spiral, the adjacent edges of the turns, or convolutions, being interfolded together in fixed and fluid-tight relationship. This coiling and interfolding of the edges of the strip is accomplished by feeding the strip into a machine as shown in the Brinkman patent No. 1,198,392 (Appeal Record, pp. 93 to 100).

There is also formed in this strip which has been coiled and its coils interfolded together, a central longitudinal groove which forms a corrugation extending helically or spirally about the tube in its finished condition. This tube as it emerges from the machine is as shown at 59 in Fig. 7 of the said Brinkman patent No. 1,198,392, and this tube by compressing it endwise may have its corrugations pushed closer together as shown at 97 in the Fig. 7 referred to (Fulton Testimony, pp. 29 and 30, Appeal Record).

The Plaintiff's Exhibits 5, 6 and 7 show this tube (pp. 14 and 15, Appeal Record), the one of those exhibits which is cut away along the central longitudinal plane so as to exhibit a cross section of the tube and its seam, showing clearly the fixed and tightly compacted condition of the seam and the formation of the central groove or corrugation. In this tube the flexibility is provided by the bending of the corrugations, the sides of which move toward and away from each other and lend flexibility to the tube. This feature of having the seam of the strip formed fluid tight and immovable, and providing a corrugation which imparts flexibility to the tube by its bending, is to be compared with the previous strip formed tubes of which Plaintiff's Exhibits 2, 3 and 4 are examples.

In these prior tubes flexibility was provided by making the seam or joint loose so that the parts could slide with relation to each other. This looseness in the joint or seam prevented it from being fluid-tight, except when made so by a packing of which many kinds are in use, such as soft metal, asbestos, rubber, leather, etc. (Fulton Testimony, p. 15, Appeal Record), the one of the exhibit tubes which is cut away to exhibit the cross section (Pltf.'s Exs. 5, 6 and 7), showing a copper wire in the seam to act as packing and making the joint fluid-tight. Inasmuch as looseness in the joint was depended upon for flexibility in these prior tubes, and the wear and strain incident to the movement required it, these tubes were made of comparatively thick material so that its section between successive seams was substantially rigid and unbending (Fulton Testimony, p. 15, Appeal Record). These previous tubes were short-lived (Fulton Testimony, p. 15, Appeal Record), due to the movement in the seam which wore out the packing which could not be replaced as it will be obvious that the tube could not be taken apart to replace the packing without destroying the tube. Also these prior tubes having flexibility by looseness in the joint, and being otherwise rigid, were not of easy or smooth flexibility as will be seen upon attempted flexure of Plaintiff's Exhibits 2, 3 or 4. On the other hand, the so-called Titeflex tube (Pltf.'s Exs. 5, 6 and 7) is made of very thin strip (five thousandths of an inch thick) (p. 18, Appeal Record) and the flexibility is provided by the bending in the corrugations as distinguished from the sliding in the seam or joint of the prior tubes. The seam of the Titeflex tube is compacted together so that the seam is fluid-tight and fixed. No packing is necessary and there is no wear in the joint as in the prior sliding joint tubes. The life of the Titeflex tube is therefore indefinitely prolonged over that of the loose joint tube and the manner of providing flexibility, namely by the bending in the corrugation instead of sliding in the joint, produces smoother and easier flexing as will be apparent upon comparing the flexure of the Titeflex tube (Pltf.'s Exs. 5, 6 and 7) with the so-called interlocked tube (Pltf.'s Exs. 2, 3 and 4) with its sliding in the seam.

The Titeflex tube, therefore, to sum up its advantages over the interlock or sliding seam tube previous to it, was of metal (no packing in the seam), its seam was fixed and tight and flexibility was provided by bending in the corrugations whereby the life of the tube was indefinitely prolonged over that of the previous interlock or sliding joint tube (there being no packing or moving parts in the joint to cause deteriorating wear) and a thinner thickness of strip from which the tube was formed, could therefore be employed so that the Titeflex tube was far superior as to flexibility, to the previous sliding joint or interlock tube (Fulton Testimony, pp. 14 and 15, Appeal Record).

To state the situation briefly, the Titeflex tube was very much more durable and was more efficient as a flexible tube.

While the Titeflex tube was thus superior as a flexible tube to what had gone before, it was found that in practice it had certain disadvantages. *The chief disadvantage was that where the Titeflex tube was subjected to twisting force there was likely to be caused relative movement of the strip edges within the seam and circumferentially of the tube. This sliding, if it occured, would destroy the fluid-tightness of the seam, and the seam, having been loosened up, would, under repeated flexings, tend to work looser and looser until the tube was practically destroyed* (Fulton Testimony, pp. 16 and 17, Appeal Record). *It was not permissible therefore that even the slightest circumferential sliding in the seam should be started* (Fulton Testimony, p. 17, Appeal Record). This was especially true in view of the fact that the metal from which the Titeflex tube was formed was so extremely thin. Another of the disadvantages of the Titeflex tube was that when extremely high pressure fluid was being conveyed by the tube, such fluid entered within and exerted pressure upon the sides of the corrugations, tending to spread them apart, with the result that the tube would be elongated and perhaps given a permanent set which would be injurious.

Mr. Fulton tells (p. 16, Appeal Record) of the efforts made, the experiments performed and the expedients tried to avoid these disadvantages. He also points out the lack of success of these efforts and of the trials of other ways of overcoming the difficulty and testified (pp. 16 and 17, Appeal Record) that the solution was made by Mr. Brinkman who finally solved the difficulty by winding the Titeflex tube in opposite directions with helical or spiral strips bearing against the outer circumference of the tube and fastened at their ends to the couplings. Mr. Fulton testifies (p. 17 and p. 18, Appeal Record) how even after Mr. Brinkman suggested this solution, which was found to be successful, it was a matter of discussion and doubt in the Titeflex factory and that he himself did not believe that it would work. Mr. Fulton explains that his main reason for so thinking was that the spiral or helical strips upon the Titeflex tube, as proposed by Mr. Brinkman would, upon application of force tending to twist or elongate the tube, tend to reduce in diameter, and so come forcibly against the Titeflex tube which, on account of the extremely thin material of which it was formed, would yield under this pressure (instead of being rigid and unyielding) which would permit the twisting action to start and ultimately result in the destruction of the tube. Mr. Fulton then goes on (pp. 18 and 19, Appeal Record) to explain that when a test of the Brinkman solution was made and it was found that it was successful, he attributed the fact that the Titeflex tube withstood the inward pressure of the strips, upon the application of force tending to twist or elongate the tube, to the condition that the corrugations on the tube not only provided the bendable portions giving flexibility to the tube, but also provided strengthening ribs which were successful in resisting the inward pressure of the encircling strips.

It will thus be seen that by his present invention Mr. Brinkman has produced a combination of a Titeflex tube with spirally or helically wound strips bearing thereon and secured to the Titeflex tube at its ends, wherein the Titeflex tube is prevented from elongation or circumferential sliding in its seam upon the application of force tending to elongate or twist it, the action of such helical or spiral strips preventing this because the spiral or helix of the strip could not reduce in diameter (if the strip helix could reduce in diameter then the tube could slide in the seam on twisting, or elongate, or both), and such reduction in diameter was prevented by the resistance opposed by the Titeflex tube against which the helical strips lay, the Titeflex tube being able to successfully oppose such resistance by reason of its corrugations which, in addition to providing an improved flexibility, form strengthening ribs upon the Titeflex tube. It will thus be seen that the Titeflex tube and its encircling helical strips, acted and reacted upon each other with the result that a tube having the improved flexibility, long life and other desirable characteristics of the Titeflex tube (but without the vulnerability to twisting and elongation as noted) was produced. In other words, the combination of the helical strips with Titeflex tube as set forth in the present application, and upon which a patent is now sought, produces a tubular structure which has all the advantages, and none of the disadvantages, of the Titeflex tube, which tube has been practically perfect in operation and has gone into large commercial use.

Mr. Stone of the Titeflex Company testifies (pp. 22 and 23, Appeal Record) that his concern, the Titeflex Metal Hose Co., has, since the Brinkman invention for which a patent is now sought was made, put out approximately 4,000,000 feet of hose or tube embodying that invention, such tube being of a value of about a million and a half dollars, and that approximately 928,000 feet of hose of an approximate value of $360,000 was put out in 1928, and about the same in 1929, and that the hose here involved, namely the Titeflex with the helically stranded covering (Pltf.'s Exs. 8 and 9) has practically superseded the former Titeflex hose like Plaintiff's Exhibits 5, 6 and 7.

The Case Against Patentability.

In support of his contention that the invention sought to be patented is not patentable, the defendant-appellee has simply offered in evidence (Deft.'s Ex. D1) the following United States Patents (copies of which are bound in the back of the Appeal Record):

No. 606,557	to Kelso, *et al.*
933,516	to Witzenmann
1,054,244	to Rudolph, and
1,198,393	to Brinkman

without any testimony whatever in explanation thereof. However, Mr. Fulton has explained these patents and shown that they are not a sufficient basis upon which to hold the present invention unpatentable. Mr. Fulton testifies (p. 28, Appeal Record) that he does not find in these prior patents any suggestion of the invention here involved nor of any way of accomplishing the same results. As above pointed out, Mr. Fulton's testimony has not been contradicted or modified by any testimony adduced by the defendant, no witnesses having been examined by the defendant.

Detailed Consideration of the Prior Patents.

The Kelso patent No. 606,557.

This patent does not disclose any corrugated metal tube nor in fact any metal tube nor any corrugated tube at all. It discloses a plain cylindrical rubber tube having about it helical metal strips secured to the couplings at the ends of the rubber hose. These strips in the Kelso patent form an armor for the rubber tube to protect it from mechanical injury by coming against sharp or jagged objects likely to injure it, and also to reenforce the rubber tube against bursting under high pressure of fluid contained within it. There is nothing in the Kelso structure involving the problem of preventing circumferential sliding in a tube seam as exists in the strip-formed corrugated tube of the present invention. It does no harm for the rubber tube of Kelso to twist and since the rubber tube is resilient it does not oppose any resistance to the reduction in diameter of the coiled metal strips, so that the tube does not cooperate with the strips to prevent twisting or elongation. The problem therefore of preventing even the starting of sliding in the circumferential seam of the strip-formed corrugated tube of the present invention was not even presented in Kelso to say nothing of it being solved. No idea of the conception involved in the present invention, as above set forth, was even hinted at. Mr. Fulton's testimony to this effect will be found at pages 25 to 27 inclusive, Appeal Record.

The Witzenmann patent No. 933,516.

This patent discloses an inner tube *b* which is commonly known as *interlocked* hose such as is shown in Plaintiff's Exhibits 2, 3 and 4 (Fulton Testimony, p. 21, Appeal Record), such tube or hose being flexible by reason of looseness and consequent sliding in the joint or seam. This construction of the hose is clearly shown by the sectional view shown in Fig. 2 of the Witzenmann patent. Presumably this character of hose is called *interlocked* because the convolutions are so formed as to interlock with each other so as to prevent their dislocation other than to a certain degree which permits the sliding necessary to the flexibility. This interlock tube is apparently secured to couplings at its ends and is provided with a covering *h*. In regard to this the patent says:

> "The hose sections b-b may be protected by a plaited or like covering *h* (Fig. 2) if desired."

This is all that is said about the covering *h*. It may be simply of canvas or other plaited or woven material designed to keep dirt out of the joints. It would appear that it is not secured to the couplings for if it were (and it were of metal which does not appear), it would tend to prevent elongation of the tube between the couplings whereas other means are provided for preventing such elongation, namely the rope or cable *d* which passes through the tube and is secured to the coupling. It is to be noted that in the *interlocked* tube of this patent, it having a loose joint to provide flexibility, it would do no harm for there to be sliding of the parts in the joint or seam, because such joints are loose anyhow, so that there is no problem of preventing movement in the seam or joint by twisting, but such prevention is an absolute necessity in the hose of the present invention. Furthermore, it not appearing that the plaited covering *d* is of metal or that it is secured to the coupling 1 it could not possibly have any effect in preventing elongation or twisting of the tube within it. In this Witzenmann patent also, therefore, is found no suggestion of the problems solved by the applicant in connection with the present invention and of course no solution of them. Here again is no hint of the Brinkman invention here involved. The testimony of Mr. Fulton in regard to this Witzemann patent will be found in the Appeal Record at pages 23, 24 and 25.

The Rudolph patent No. 1,054,244.

Mr. Fulton has testified regarding this patent at pages 27 and 28 of the Appeal Record, from which it appears that the Rudolph patent comprises an inner tube 1 having a sheathing or covering of plaited helical metal strips. The object of the device is said to be to avoid the condition that where the sheathing is not secured to the coupling it is drawn away from the coupling during elongation of the tube, and does not reenter when the tube is again shortened. The tube 1 is of the interlocked type and is designed to provide flexibility by sliding in the joint or seam as in the tube *b* of the Witzenmann patent No. 933,516, and as in the Plaintiff's Exhibits 2, 3 and 4. This is made certain by the statement in the Rudolph patent that the edges of the helically wound strip forming the tube are *interlocked.* The patent states at lines 55 to 57 of page 1 as follows:

> "The flexible pipe 1 is formed by a suitably shaped helically wound strip of metal, the edges of which interlock".

This expression refers to tubes like Plaintiff's Exhibits 2, 3 and 4 (Fulton Testimony, pp. 21, lines 2 to 4 inclusive, Appeal Record) and is the whole tenor of his testimony in this relation.

As explained in connection with the Witzenmann patent, this interlocked tube is designed to provide flexibility by sliding in the seam so that such sliding as is occasioned by twisting, would not be objectionable, and the tube is of heavier material than the Titeflex, so that none of the problems presented by the Titeflex structure, namely the prevention of sliding (even to the smallest degree) in the seam, and the capability of the inner tube withstanding the pressure of the metallic strips upon the application of a twisting or elongating force, did not enter into the consideration of the Rudolph structure so that the problems of the Titeflex tube not being presented, were, of course, not solved.

Certainly there is not shown or described in this Rudolph patent any tube which is formed from a helically disposed strip having a corrugation upon the bending of which the tube depends for flexibility (as distinguished from providing flexibility by sliding in the joint or seam) which is a necessary element of applicant's combination and is specified in every one of the claims in issue. Anticipation cannot be predicated upon mere speculation even if the Rudolph patent did not clearly indicate a sliding joint tube (which it does as above set forth). A prior patent is only effective for what it clearly discloses.

The Brinkman patent No. 1,198,392.

This patent, which is assigned on its face to the Titeflex Metal Hose Corporation, shows a corrugated tube the same as Plaintiff's Exhibits 5, 6 and 7 (Fulton testimony, p. 23, Appeal Record), which, with the helical strips applied to it forms the subject matter of the invention here claimed (Fulton Testimony, p. 14, Appeal Record). This is the tube (Fulton Testimony, p. 14, Appeal Record) that was being manufactured by the Titeflex Metal Hose Corporation when Mr. Fulton first went with it in 1916, and to improve which the present invention was made. The Brinkman patent referred to discloses simply the bare corrugated tube and there is nothing said in the patent about any helical strips. As we understand it this Brinkman patent was cited merely for the purpose of showing that one element of the combination sought to be patented, namely the corrugated tube, was old.

The Claims in Issue and Their Comparison With the Prior Art.

From the foregoing it is thought that it will appear that applicant's structure constituting the present invention, is not found nor suggested in any or all of the patents referred to, and it is submitted that the claims sought to be patented express the differentiation of the subject matter of this suit from that of the patents cited against it. These claims are for convenience reprinted here as follows:

> 1. The combination with a corrugated tube depending for its flexibility on relative movement of the corrugation sides, of a strand outside the corrugation of said tube and bearing upon said corrugations, said strand being wound helically about said tube and connected to the ends of said tube.
>
> 2. The combination with a corrugated tube depending for its flexibility on relative movement of the corrugation slides, of strands helically wound about said tube in opposite directions, bearing against said corrugations and connected to the ends of said tube.
>
> 3. The combination with a flexible tube comprising a helically disposed strip having a central longitudinal groove forming a corrugation and having the adjacent edges of contiguous convolutions interfolded, said tube depending for flexibility on relative movement of the cor-

rugation sides, of strands wound helically about said tube in opposite directions, bearing against said corrugations and connected to the ends of said tube.

4. The combination with a flexible corrugated tube formed of a helically disposed strip having a central longitudinal groove forming a corrugation and the adjacent edges of contiguous convolutions interfolded, said tube depending for flexibility upon relative movement of the corrugation sides, fittings secured to said tube at its ends, and strands helically wound about said tube in opposite directions bearing against said corrugations and secured to said fittings.

5. The combination with a corrugated tube depending for flexibility upon relative movement of the corrugation sides formed of a helical strip having the edges of adjacent convolutions in engagement, of means for preventing twisting of the said tube whereby tendency to cause sliding in the joint between adjacent convolutions is overcome.

Referring first to claim 4, which follows most in detail, the construction shown in the application for patent here involved. This claim comprises three elements as follows:

(1) A flexible corrugated tube formed of a helically disposed strip having a central longitudinal groove forming a corrugation and the adjacent edges of contiguous convolutions interfolded, said tube depending for flexibility upon relative movement of the corrugation sides.

(2) Fittings secured to said tube at its ends.

(3) Strands helically wound about said tube in opposite directions bearing against said corrugations and secured to said fittings.

The patent to Brinkman shows a tube as specified in element (1) but it does not show either of the other two elements of the claim. This Brinkman patent shows the old Titeflex tubes which was being made before the present invention and is subject to the advantages and disadvantages as hereinbefore pointed out. None of the other prior patents in evidence (Kelso, *et al.*, Witzenmann or Rudolph) show the tube of the present invention and as described in element (1). This is quit apparent from a consideration of the patents and is shown by the decisions of the Primary Examiner and of the Board of Appeals in the Patent Office (pp. 57 and 58 and pp. 64 and 65, Appeal Record), in which it was recognized that no such tube as described in element (1) was found in any of the cited patents other than the prior Brinkman patent, the claim being refused upon the ground that the tube as described in element (1) being old as shown in the Brinkman patent cited, and a helically stranded covering on other tubes being old as shown in the other patents cited, there was no invention in applying the braided covering of these other patents to the tube of the Brinkman patent in such a manner as to form the combination claimed. It will be observed that the same prior patents which have been offered in evidence in this proceeding by the defence were relied upon by the Patent Office in refusing the patent. It is also to be borne in mind that this decision of the Patent Office was made upon the paper record before it, and that there was not before it the matters which have been brought out in the testimony herein, namely the production of a superior hose (longer lived and smoother flexing) by the solution of problems in connection with the tubing of the Brinkman patent cited, such problems being solved *by the prevention of any circumferential sliding whatever in the seam (which would be followed by loss of fluid tightness and the rapid deterioration of the tube) and the prevention of elongation of the tube under internal pressures, and this consistent with the strength of the tube formed of very thin material to secure the flexibility and be adapted to be formed into a tube by being drawn through a die.* None of these results or problems was referred to in the cited patents, and so could not have been solved therein. There is no suggestion in any of the cited patents of any such problem or its solution.

Taking up now specifically the patents relied upon, other than the Brinkman patent, their relation to claim 4 is as follows:

The Kelso, et al., patent **refers to the application of the stranded covering to rubber tubes and to ropes.** It does not show a tube as defined in element (1) of the claim. As has been referred to above as having been brought out in Mr. Fulton's testimony, the rubber tube or rope is not rigid or stiff so as to resist inward movement of the sheathing upon attempted twisting or elongation, but will give under the pressure of the sheathing so that, the sheathing being permitted to reduce in diameter it can twist and elongate, so that *twisting or elongation of the tube is not prevented by the sheathing and in fact no necessity for any such property existed because twisting or elongation of the tube, to some extent, was not objectionable in connection with the Kelso, et al device.* The Kelso tube quite obviously is not a tube formed of a helical strip, has no corrugation and has no seam. It is foreign to any of the considerations involved in the present invention.

The Witzenmann patent No. 933,516.

It is immediately apparent from reading the Witzenmann patent and from the testimony of Mr. Fulton in relation thereto, that the device of the Witzenmann patent does not have a corrugated tube, it is not formed of a strip having a central longitudinal groove forming a corrugation and the tube does not depend for flexibility upon relative movement of the corrugation sides as is expressly specified in the claim as characterizing element (1). The tube of Witzenmann is not corrugated and depends for its flexibility upon sliding in the seam and not upon the relative movement of corrugation sides. This is set forth in the testimony of Mr. Fulton at pages 23, 24 and 25 of the Appeal Record, wherein it appears that element (1) of claim 4 is not found in the Witzenmann patent. The tube of the Witzenmann patent is an interlocked tube as shown in Plaintiff's Exhibits 2, 3 and 4. The tube is not corrugated but depends for its flexibility upon looseness and sliding of the parts in the seam and the strip is of heavy metal as compared with the thin strip from which the Titeflex tube is formed. In this Witzenmann tube, therefore, *there was no problem of preventing movement in the seam by reason of twisting because the seam was intended to have its parts moveable; and there was no problem about the tube being strong enough to resist any pressure exerted upon it by the braided covering.* This was because, as we have seen, *the Witzenmann structure presents no reason why the braided covering should be prevented from decreasing in diameter because twisting would not damage the loose jointed tube, and also because, the strip forming the tube being thicker and heavier, there would be no question about its withstanding any pressure which might be brought upon it by any contraction of the braid.*

The Witzenmann tube has fittings secured to it at its ends and so apparently has element (2) of the claim.

It does not appear that the Witzenmann patent has element (3) of the claim. Mr. Fulton points out that the *braided covering does not appear to be fastened to the couplings* and that such fastening seams to be negatived by the fact that in the Witzenmann patent a cable or member *d* (see Witzenmann patent) passes through the tube and is fastened to the couplings to re-enforce the tube against elongation. This would be unnecessary if the braided covering were secured to the couplings. Apparently this braided or woven covering is designed to keep dust and grit of the railroad service, for which this tube is designed, from entering the joints of the tube. It is pointed out by Mr. Fulton (p. 17, Appeal Record) that *it is an essential of the invention here claimed that the spiral strips should be secured to the couplings*, as otherwise the strips would not have any effect upon attempted elongation or twisting of the tube. Certainly none of the problems of the present invention were solved, or even presented, in this Witzenmann patent and a perusal of it does not disclose any hint of such problems or their solution.

The Rudolph patent No. 1,054,244.

The patent to Rudolph does not disclose element (1) of claim 4. *The tube of Rudolph is of the interlock type* (as shown in Plaintiff's Exhibits Nos. 2, 3 and 4) wherein flexibility is provided by movement in the seam rather than by movement of the corrugation sides in a corrugation formed in the strip of which the tube is formed, and in fact the Rudolph tube is not corrugated at all, so that it does not respond to the terms of element (1) of the claim which specifies that the tube is formed of a helically disposed strip having a central longitudinal groove forming a corrugation and the adjacent edges of the contiguous convolutions interfold, such tube depending for flexibility upon relative movement of the corrugation sides. This patent is testified about by Mr. Fulton at pages 27 and 28 of the Appeal Record where it appears that the tube of Rudolph to which the plaited covering is applied, is of the interlocked type (like Pltf.'s Exs. Nos. 2, 3 and 4). This is confirmed by the statement in the Rudolph specifications, page 1, line 57, that the edges of the strip "interlock", and Mr. Fulton has testified at various places in his testimony, and specifically at Appeal Record, page 21, lines 2, 3 and 4, that this expression refers to tubes like Plaintiff's Exhibits 2, 3 and 4. Such tubes provide for flexibility by looseness in the seam whereby the parts may slide, the same as in the tube of the Witzenmann patent, so that the element (1) of claim 4 is not found in the Rudolph patent. *As in the case of the Witzenmann patent there is no question of preventing twisting of the Rudolph tube, and since the interlocked type of tube is made of heavier metal there is no question of the tube being able to withstand any pressure which may be exerted upon it by the braided covering. In this Rudolph patent, therefore, there is no solution of, or even a presentation of, the problems solved by the present invention,* and a perusal of the Rudolph patent discloses no hint or suggestion of such problem or its solution.

Claim 3 is the same as claim 4 except that the couplings are not specified. On the other hand claim 3 specifies that the strands are connected to the ends of the tube. This claim is designed to cover cases where, for one reason or another, couplings would not be required. The object of the invention is attained when the ends of the strands are secured to the ends of the tube, whether by the invention of couplings or directly. Ordinarily couplings would be required at the ends of the tube and, when used, would supply the means by which the strands were secured to the tube at its ends. As above stated claim 3 is so worded as to cover cases where the couplings are omitted and the strips secured directly to the tube ends. This claim is patentably differentiated from the prior patents in the same way as has been set forth in connection with claim 4.

Claim 5 is a broader statement than that of either claims 3 or 4, but is differentiated from the prior patents offered by the defense in that this claim specifies "a corrugated tube depending for flexibility upon relative movement of the corrugation sides", whereas, as has been above set forth, neither Kelso, *et al.,* Witzenmann nor Rudolph show any such tube and the prior Brinkman patent does not have any "means for preventing twisting of the said tube whereby tendency to cause sliding in the joint between adjacent convolutions is overcome" as is specified in claim 5.

Claim 2 is a broader statement of the invention, but is patentably differentiated from the prior patents offered in evidence by the defendants in that there is not found in Witzenmann, Rudolph nor Kelso, *et al.,* "a corrugated tube depending for its flexibility on relative movement of the corrugation sides" and there is not found in the prior Brinkman patent "strands helically wound about said tube in opposite directions, bearing against said corrugations and connected to the ends of said tube" as is specified in the claim.

Claim 1 is still a broader statement of the invention but is differentiated from the prior patents in the same way as claim 2. Claim 1 differs from claim 2 in specifying but a strand which may be wound about the tube in one direction. This would, of course, not be sufficient to resist twisting forces in both directions, but it might be sufficient under some circumstances to guard against twisting in one direction, and inasmuch as the claim is differentiated from the structures shown in the prior patents, it is believed that it is allowable.

Argument and Authorities.

It appears from the foregoing that the Titeflex tube (Pltf.'s Exs. Nos. 5, 6 and 7 and as shown in the Brinkman patent No. 1,198,392) was being made by the Titeflex Company at the time Mr. Fulton who has testified herein, went with that company in 1916 as Chief Engineer and Factory Manager. This tube had many advantages. The edges of adjacent convolutions of the strip of which the tube was formed, were pressed into firm and fluid tight relation so that the tube was fluid tight without the necessity of any packing and the life of the tube was therefore greatly lengthened over tubes of the prior art (Pltf.'s Exs. Nos. 2, 3 and 4) wherein flexibility was provided by looseness in the seam between adjacent convolutions which permitted the parts within the joint to relatively move. With such movable seam tubes, which required packing to make them fluid tight, the packing soon wore out and there was no way to replace it because the tube would be destroyed in taking it apart for that purpose. Also the wear and leverages developed by the movement of the parts within the seam contributed to the rapid deterioration of the tube. In order to withstand this wear, etc., as much as possible, the strip of which the tube was formed was made of thick material so that there was substantially no flexure in the strip other than that provided by movement in the joints. This detracted greatly from the flexibility of the tube, and it was not smoothly or easily flexible (see Pltf.'s Exs. Nos. 2, 3 and 4) as was the Titeflex tube (Pltf.'s Exs. Nos. 5, 6 and 7).

While this Titeflex tube had these advantages it was subject, under certain conditions of use, to disadvantages, namely *circumferential sliding of the parts in the seam under twisting forces* and elongation of the tube, under high pressures of the fluid conveyed by the tube, *which had a deleterious effect on the seam.* This is set forth in Mr. Fulton's testimony (pp. 15, 16 and 17, Appeal Record). The slightest slipping in the seam, was not to be permitted because it resulted in the loss of fluid-tightness and rapid deterioration of the tube. Mr. Fulton sets this forth at page 17 of the Appeal Record. Mr. Fulton also sets forth (p. 16, Appeal Record) that various attempts were made to relieve against these disadvantages of the Titeflex tube without success, and that the final solution was submitted by Mr. Brinkman (p. 16, Appeal Record) who suggested that the spiral strips be applied to the tube in the manner as set forth in the application for patent here involved, and as exemplified in Plaintiff's Exhibits Nos. 8 and 9. Mr. Fulton testified (pp. 17 and 18, Appeal Record) that there was considerable discussion whether or not Mr. Brinkman's proposed solution would be effective, and that Mr. Fulton personally believed that it would not work and explains why he thought it would not work, namely that the strip of the Titeflex tube was so thin that it would not withstand the pressure occasioned by the tendency of the helical strips to reduce in diameter, which would be occasioned by an attempted twisting or elongation of the tube. Mr. Fulton then goes on to testify (pp. 19 and 20, Appeal Record), nevertheless, how the Brinkman invention here involved was successful in solving the problem and gives his explanation of why that was so. He explains the success of the tube in withstanding the inward pressure of the helical strands upon the ground that the corrugations formed strengthening ribs which developed an unexpected strength sufficient to resist the inward pressure of the helical strands when the tube was subjected to elongating or torsional force.

This tube forming the subject matter of the present invention has met with great commercial success. Mr. Stone, the Vice President and General Manager of the Titeflex Metal Hose Co. which is the manufacturer of this hose, testifies that his company has manufactured the hose as shown in Plaintiff's Exhibits 8 and 9, and as shown in the application for patent here involved, to the extent of about 4,000,000 feet representing a value of about one million and a half dollars, and that during the last two years (1928, 1929) there was manufactured in each year about 928,000 feet, representing a value of probably $360,000, and that his hose is now the standard product of the Titeflex Company and that it has practically superseded the previous Titeflex hose as shown in Plaintiff's Exhibits 5, 6 and 7 (pp. 21, 22 and 23, Appeal Record).

It appears from the foregoing that none of the prior patents referred to shows the hose forming the subject matter of the present invention and as defined in the claims; that there is not found in any of the prior patents any suggestion of the solutions of the problems which were solved by Mr. Brinkman in making the present invention, and that by such invention he has produced a hose which is superior in flexibility and durability as has been above set forth.

It is submitted that this shows a meritorious advance in the art which is entitled to the protection of a patent.

It will be seen from the decision of the Primary Examiner and of the Board of Appeals of the Patent Office that it was not held that any of the prior patents referred to showed the structure as here claimed, but that the differences of the device of the present application over the prior art—what Mr. Brinkman had accomplished—did not amount to invention. In other words that it was obvious to solve the problems which he solved in the manner that he did. This holding of the Patent Office, however, as above pointed out was made upon the bare copies of the patents referred to without the benefit of the testimony of any witnesses, the Patent Office having no provision for the taking of such testimony. It did not have before it the testimony of the witnesses in this case showing the peculiar problems involved, the unsuccessful efforts to solve them, the doubt by engineers working in this art that the solution forming the subject matter of this invention would be successful, its proved success and its large commercial use.

It may have seemed easy to the Patent Office to combine the elements taken from different paper showings to produce the hose here sought to be patented, but the testimony herein shows the facts as to the actual structure to be otherwise. The courts have noted that the assuming of knowledge after the fact is an extremely easy error to fall into and it was especially easy for the Patent Office which did not have before it the testimony as to the difficulties and facts surrounding the present invention.

This court in

In re Huff, 48 App. D. C. 258,

in reversing the Patent Office which refused a patent, stated:

> "Many things appear easy after they have been explained, and doubtless many a man has wondered why he failed to think of some apparently simple device or improvement that yielded a fortune to the one who did and revolutionized an industry. The simple fact is that the average person sees things as they are, and he who has originality of vision enabling him to visualize defects and the means of overcoming them should receive adequate reward."

Also the Supreme Court of the United States in

Webster Loom Co. v. *Higgins,* 105 U. S. 580; 26 Law. Ed. 1177,

said:

> "At this point we are constrained to say that we cannot yield our assent to the argument, that the combination of the different parts or elements for attaining the object in view was so obvious as to merit no title to invention. Now that it has succeeded, it may seem very plain to any one, that he could have done it as well. This is often the case with inventions of greatest merit. It may be laid down as a general rule, though perhaps not an invariable one, that if a new combination and arrangement of known elements produces a new and beneficial result never attained before, it is evidence of invention."

To the same effect is the decision of the United States Supreme Court in

Diamond Rubber Co. v. *Consolidated Rubber Tire Co., et al.,* 220 U. S. 435; 55 L. Ed. 532, wherein it was stated:

> "Knowledge after the event is always easy, and problems once solved present no difficulties, indeed, may be represented as never having had any and expert witnesses may be brought forward to show that the new thing which seemed to have eluded the search of the world was always ready at hand and easy to be seen by a merely skilful attention. But the law has other tests of the invention than subtle conjectures of what might have been seen and yet was not. It regards a change as evidence of novelty, the acceptance and utility of change as a further evidence, even as demonstration. And it recognizes degrees of change, dividing inventions into primary and secondary, and as they are, one or the other, gives a proportionate dominion to its patent grant. In other words, the invention may be broadly new, subjecting all that comes after it to tribute (Chicago & N. W. R. Co. v. Sayles, 97 U. S. 554, 556; 24 L. ed. 1053, 1054); it may be the successor, in a sense of all that went before, a step only in the march of improvement, and limited therefore, to its precise form and elements, as the patent in suit is conceded to be. In its narrow and humble form it may not excite our wonder as may the broader or pretentious form, but it has as firm a right to protection. Nor does it detract from its merit that it is the result of experiment and not the instant and perfect product of inventive power. A patentee may be baldly empirical, seeing nothing beyond his experiments and the result; yet if he had added a new and valuable article to the world's utilities, he is entitled to the rank and protection of an inventor."

To the same effect are the decisions in

> *General Electric Co.* v. *Alexander* (D. C. New York), 277 F. 290;
>
> *National Malleable Casting Co.* v. *American Steel Foundries* (C. C. New Jersey), 182 F. 626;
>
> *Waterbury Buckle Co.* v. *G. E. Prentice Mfg. Co.* (D. C. Connecticut), 294 F. 930,

and many others.

It is not necessary to invention that the parts of a device nor any of them be new. It is well established that an invention may reside in a new combination of old elements. This is stated in the above quotation from the opinion in the case of

Webster Loom Co. v. *Higgins, supra.*

To the same effect is the decision of the Supreme Court in

Seymour v. *Osborne,* 11 Wall 542; 20 L. Ed. 33, and
In re Champeau, 34 F. (2d) 1012.

In the latter case, the Court of Customs and Patent Appeals in reversing the decision of the Board of Appeals of the Patent Office in denying a patent stated:

> "We are unable to see, after an examination of these references, why the appellant is not entitled to the patent he claims. It is true that the references show that prior to appellant's application the various elements going to make up appellant's device were each well known. It is true also that a somewhat similar result might be obtained, at least by Taepke's patent. But, even though there be nothing novel in the elements combined, if applicant here has, by a combination of known elements, accomplished a new and useful result, he is entitled to his patent."

And to the same effect is the decision of the same Court in

In re Angert, 34 F. (2d) 1014,

wherein the Court reversed the decision of the Patent Office and held the claims patentable. Other cases to the same effect are

Sessions v. *Romadke,* 145 U. S. 29;
Hobbs v. *Beach,* 180 U. S. 383;
Taylor v. *Sawyer Spindle Co.,* 75 F. 301;
Stevenson v. *McFassell,* 90 Fed. 707;

National Brake Beam Co. v. *Interchangeable Brake Beam Co.,* 106 F. 693;

Detroit Carrier & Mfg. Co. v. *Dodge Brothers,* 33 F. (2d) 743,

and many others could be cited showing this well settled rule.

On the question of invention, what constitutes "invention" as distinguished from "mechanical skill" is not susceptible of exact definition. In the case of

A. Kimball Co. v. *Noesting Pin Ticket Co.,* 262 F. 148,

it was stated:

> "Invention, as we are instructed by the highest court, is not judicially to be defined; i.e. it cannot be determined as to limit of meaning. But many attributes may be marked."

This opinion then goes on to state:

> "It is, of course, urged, and naturally, that no more than a mechanic's skill was needed to take the final step. But a mechanic is one who applies his trade by rule or rote, and only uses what he learned yesterday to do the work of to-day, in the same old manner. He may do it excellently, but if he has, not only hind sight, but insight or foresight, as to comprehend the problem and use even the learning of yesterday to do the new thing in a new way, that mechanic has usually earned the inventors title."

This Court in

In re Pupin, 299 F. 697,

reversed the holding of the Patent Office refusing a patent, and granted the patent as involving invention in view of the important results achieved in the art. To the same effect is the decision in

Kurtz v. *Belle Hat Lining Co. Inc.,* 280 F. 277.

In *H. D. Smith & Co.* v. *Peck, Stow & Wilcox Co.,* 262 F. 415, the Court of Appeals for the Second Circuit, stated:

> "Whether the structure involves invention is a question of facts, and the determining factor is not whether the achievement is difficult or easy, but whether it has, in point of fact, given the world something of real value, that it did not have—a benefit conferred upon mankind. O'Rourke Engineering Const. Co. v. McMullen, et al., 160 F. 933; 88 C. C. A. 115."

The case of *O'Rourke Engineering Const. Co.* v. *McMullen, supra,* was followed in the case of

> *Matrix Contrast Corp.* v. *Kellar,* 34 F. (2d) 510,

the rule being stated in the *O'Rourke* case as follows:

> "The principal question in such cases is: has the patentee added anything of value to the sum of human knowledge; has he made the world's work easier, cheaper, and safer, would the return to the prior art be a retrogression? When the Court has answered this question, or these questions, in the affirmative, the effort should be to give the inventor the just reward of the contribution he has made."

The Circuit Court of Appeals for the Third Circuit in

> *United Verde Copper Co.* v. *Pierce-Smith Converter Co.,* 7 F. (2d) 13,

states:

> "Here was inventive discovery which involved the intelligent comprehension of relations not before recognized, although actually existing, followed by the conception of how they can be practically utilized. Eck v. Kutz, (C. C.) 132 F. 758, 779."

Invention lies more in the inventive thought or conception of doing the thing than in the actual doing of it.

> *Matrix Contrast Corp.* v. *Kellar, supra;*
> *In re Angert, supra;*

R. Hoe & Co. v. *Goss Printing Press Co.*, 30 F. (2d), 271;

Patents Selling & Exporting Co., Aktieselskak v. *Dunn*, 204 F. 99.

Patentable novelty is found in discovering the difficulty with an existing structure and the changes in the elements necessary to correct the difficulty. This is closely analagous to the present case. Thus it was stated in

Baltzley v. *Spengler Loomis Mfg. Co.*, 262 F. 423,

that

> "Patentable novelty is some times found in discovering what is the difficulty with an existing structure and what change in its elements will correct the difficulty even though the means in introducing that element into the combination are old and their adaptation to the new purpose involves no patentable novelty."

And invention was found for reasons as stated. The Court also made a similar statement in holding that invention was involved in the case of

Judelson v. *Hill Laundry Equipment Co.*, 22 F. (2d), 262.

The same holding was made in

Miehle Printing Press & Mfg. Co. v. *Whitlock Printing Press & Mfg. Co.*, 223 F. 647.

The simplicity of a device is no objection to its patentability, in fact the simplicity of a device is often the greatest mark of genius. In

Murphy Wall Bed Co. v. *Rip Van Winkle Wall Bed Co.*, 295 F. 748,

it was held that the fact that a device is simple does not show lack of invention, but that to obtain absolute simplicity is the highest trait of genius.

In *Kitchen* v. *Levison,* 188 F. 659, it was said:

> "It is urged that the improvement which the appellee made on the prior art was simple and obvious. It may be conceded that it was simple, but that fact alone does not deprive the invention of patentability. There may be the highest form of invention in some of the simplest improvements on the prior art."

In *Dececo Co.* v. *Gilchrist Co.,* 125 F. 293, it was said:

> "To obtain absolute simplicity is the highest trait of genius."

And the Supreme Court of the United States, in

> *Expanded Metal Co.* v. *Bradford,* 214 U. S. 381; 53 L. Ed. 1034,

said:

> "The fact that the invention seems simple after it is made does not determine the question; if this were the rule, many of the most beneficial patents would be stricken down."

To the same effect are

> *Kurtz* v. *Blatt,* 263 F. 392;
> *Doble* v. *Pelton Water Wheel Co.,* 186 F. 526.

In the last mentioned case it was said:

> "Simplicity is no evidence of want of invention nor of obviousness. The question of patentability in such an instance may and in many cases must be determined largely from the results attained."

It is well settled that the favorable reception by the trade or the commercial success of an article is strong evidence of the existence of invention.

In the case of *Vacuum Cleaner Co.* v. *American Rotary Valve Co.,* 227 F. 998, it was said:

> "I am a strong believer in the rule as to commercial utility. It often pierces a labyrinth of the technique

> of science and the law and applies the experience of the big workaday outside world. It places achievement above forgotten files and file wrappers. It is frequently an aid to the conclusion that what seems simple to-day was an unsolved problem yesterday."

And in *Crozier-Straub, Inc.* v. *Reiter,* 34 F. (2d) 577, it was said:

> "There is no surer test of the fact of invention and the invention's claim to merit than the reception given it by the trade concerned,"

In the case of

> *Temco Electric Motor Co.* v. *Apco Mfg. Co.,* 275 U. S. 320; 72 Law. Ed. 298.

It was held that the marked success of a device evidenced by a great demand to purchase it, with large sales over a period of 10 years, indicates that invention was involved in devising it. The Court states:

> "We cannot concur with the District judge in this case, or with the Circuit Court of Appeals of the Fifth Circuit in the conclusion that there was no merit in this patent, when its usefulness was demonstrated by ten years use in such large numbers and by such profitable business."

The United States Supreme Court decided to the same effect in

> *Diamond Rubber Co. of New York* v. *Consolidated Rubber Tire Co., et al.,* 220 U. S. 428;
> *Smith* v. *Dental Vulcanite Co.,* 93 U. S. 495,

and many other cases.

In

> *Gross* v. *Frank,* 293 F. 702,

the Circuit Court of Appeals of the Fourth Circuit held that where a patented article becomes, on account of its utility a commercial success, and there is great and immediate demand for it, any doubts as to patentable novelty should be resolved in favor of the invention.

In *Macbeth Evans Glass Co.* v. *L. E. Smith Glass Co.*, 284 F. 193, the Court of Appeals for the Third Circuit held that commercial success is a weighty fact in determining the question of invention.

Cases to this effect could be multiplied indefinitely.

The size or degree of the invention has no bearing upon the question of its patentability, an inventor being entitled to protection on the invention that he has made, be it large or small.

Sanitary Fire Proofing and Contracting Co., et al. v. *Sprickerhoff, et al.*, 131 F. 869;
Valvone v. *D'Adomo*, 135 F. 544.

All doubts regarding the question of whether or not invention is involved in an application for patent should be resolved in favor of the applicant. This Court has so held in

In re Coffield, 270 F. 695;
In re Harbeck, 39 App. D. C. 555;
In re Handschuck, 46 App. D. C. 155;
In re Heath, 45 App. D. C. 370.

CONCLUSION.

It is submitted that it is shown by the record in this case and the law applicable thereto, that the device for which a patent is here sought and which is set forth in the claims here presented, is new and useful, that it is a patentable invention in view of all the tests for invention, that the prayer of the bill should be granted and that the decree of the Court below, dismissing the bill of complaint, should be reversed.

Respectfully submitted,

Thomas Howe,
Attorney for Plaintiff-Appellant.

Robert Watson,
Of Counsel for Appellant.

COURT OF APPEALS,
DISTRICT OF COLUMBIA
FILED

FOR MR. JUSTICE GRONER

MAR 21 1931

Henry W. Hodges
CLERK.

No. 5307

In the Court of Appeals of the District of Columbia

October Term, 1930

The Titeflex Metal Hose Co., appellant

v.

Thomas E. Robertson, Commissioner of Patents of the United States, appellee

APPEAL FROM THE SUPREME COURT OF THE DISTRICT OF COLUMBIA

BRIEF FOR THE COMMISSIONER OF PATENTS

T. A. HOSTETLER,
Solicitor United States Patent Office.

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APPEAL FROM THE SUPREME COURT OF THE DISTRICT OF COLUMBIA

BRIEF FOR THE COMMISSIONER OF PATENTS

This is an appeal by Plaintiff-Appellant from a decree of the Supreme Court of the District of Columbia dismissing Plaintiff's Bill of Complaint filed under Sec. 4915 R. S. (35 U. S. C. A. 63).

The five claims rejected in the Patent Office appear on pages 3 and 4 of the Record.

Claim 2, which is typical reads as follows:

> 2. The combination with a corrugated tube depending for its flexibility on relative movement of the corrugation sides, of strands

> helically wound about said tube in opposite directions, bearing against said corrugations and connected to the ends of said tube.

The references relied upon in this suit are—

Kelso *et al.,* 606557, June 28, 1898.
Witzenmann, 933516, Sept. 7, 1909.
Rudolph, 1054244, Feb. 25, 1913.
Brinkman, 1198392, Sept. 12, 1916.

In order that the Court may have the views expressed by the Patent Office tribunals attention is called to the Examiner's Statement on pages 57 to 59 of the Record and to the decision of the Board of Appeals on pages 64 to 66 of the Record. To simplify the procedure, the four patents above mentioned were relied upon. The Smith patent, the French patent, and No. 993934 being merely cumulative, were not pressed.

THE REFERENCES

The patent to Witzenmann, 933516, discloses connecting hose for railway cars, which is referred to in the specification as "so-called metallic spiral hose" (lines 29 and 30). The metal band also has "overlapping edges" (line 63).

The patent to Brinkman, 1198392, discloses flexible tubing formed of a metal band as shown in detail; the inner walls of the U-shaped strip form corrugations which may be compressed and also expanded thereby flexing the tube.

It is submitted that in all tubes of this type made of a metallic strip, there is more or less of a flexing of the interlocking faces of the strip which in the aggregate makes the tube flexible for the purpose intended.

The patent to Kelso, 606557, in figures 1 to 4, inclusive, discloses a protective covering or casing A formed by braiding flat steel wire *a,* which covering is applied to a rubber hose as shown.

The patent to Rudolph, 1054244, Exhibit D 1 *a,* discloses, as appears from his specification, line 55 et seq.:

> The flexible pipe 1 is formed by a suitably shaped helically wound strip of metal the edges of which interlock. This tube or pipe is protected by a sheath or cover 2 formed of a metallic plait or braid.

We thus see that plaintiff-applicant, Brinkman, was not the first to use the metallic sheath with tubes as shown by Kelso whose patent was granted almost 32 years ago. Nor was he the first to use a metal strand with flexible metal tubes formed of strips, the edges of which interlock, as Rudolph, whose patent 1054244 granted in 1913, is prior to Brinkman. It may be noted that Rudolph is not claiming the broad combination of a flexible tube covered by the metallic sheathing as that was probably unpatentable, even at that time. But his only claim is limited to the specific means for attaching the metallic sheath to the coupling. No testimony can negative what a patent clearly discloses. Nor does the fact that articles may be manufactured not within the disclosure of a patent change that patent in any way.

It is clear from the foregoing that Brinkman has taken his flexible tube (patented September 12, 1916, No. 1198392) and provided it with a cover which is old in the prior art as shown by Kelso, 606557, and by Rudolph, 1054244. The tube performs the same function in the same way as it did before and the sheath of strands performs the same function in the same way as it did in the prior art. Under these circumstances, it is well settled that Brinkman has made no patentable invention, in support of which the following authorities are cited:

AUTHORITIES

The case of *Hailes* v. *Van Wormer,* 87 U. S. 353, involved claims for a base-burning stove, all the devices of which the alleged combination were made were old. The Court held (p. 368) that:

> Merely bringing old devices into juxtaposition, and there allowing each to work out its own effect without the production of something novel is not invention.

The case of *Atlantic Works* v. *Brady,* 107 U. S. 192, involved claims for a dredge-boat. The Court in holding this patent void (p. 200) said:

> The design of the patent laws is to reward those who make some substantial discovery or invention, which adds to our knowledge and makes a step in advance in the useful arts. Such inventors are worthy of all

> favor. It was never the object of those laws to grant a monopoly for every trifling device, every shadow of a shade of an idea, which would naturally and spontaneously occur to any skilled mechanic or operator in the ordinary progress of manufactures.

In the case of *Bussey* v. *Excelsior Manufacturing Co.*, 110 U. S. 131, the Court held that there was no invention in claim 1 in using, to attach the base-pan, an old mode used in attaching other projecting parts of the stove.

In the case of *Adams* v. *Bellaire Stamping Co.*, 141 U. S. 539, which involved claims for a lantern, all the parts of which were old, the Court held that there was no patentable invention and quoted with approval *Hailes* v. *Van Wormer,* 87 U. S. 353 Commercial success was urged in this case, but the Court held (p. 542) that:

> Where there is no invention the extent of the use is not a matter of moment.

The case of *Derby* v. *Thompson,* 146 U. S. 476, 1892 C. D. 715, involved a child's high chair and carriage. The Court held that it required nothing more than the skill of an ordinary mechanic to adopt the most valuable features of other devices for the construction of a new chair, and that the result was rather an aggregation of old elements than the production of a new device.

Other decisions along the lines of the above are:

Burt v. *Evony,* 133 U. S. 359.
Heald v. *Rice,* 104 U. S. 737.
Hill v. *Wooster,* 132 U. S. 693.

COMMERCIAL SUCCESS

Plaintiff has made a showing of extensive sales, but it is submitted that such sales do not justify the allowance of the claims in this case.

In the matter of commercial success it is well established that extensive use is not evidence of patentable novelty where invention is otherwise lacking. *McClain* v. *Ortmayer,* 141 U. S. 419, 425; *Grant* v. *Walter,* 148 U. S. 547, 556; *Ide* v. *Ball Engine Co.,* 149 U. S. 550; *Eskimo Pie Corporation* v. *Levons,* 35 F. (2d) 120; *McGhee* v. *Le Sage & Co.,* 32 F. (2d) 875; *U. S. Sanitary Specialties Corporation* v. *West Disinfecting Co.,* 3 F. (2d) 997; *Union Biscuit Co.* v. *Peters,* 125 F. R. 601; and *Outlook Co.* v. *Malco Products Corporation,* 299 F. R. 996, 1005, par. [4.]

ARGUMENT

From the Examiner's Statement, Record page 57, and the decision of the Board, Record page 64, it appears that the applicant has selected his tube illustrated in his patent No. 1198392, and provided it with strands wound helically in opposite directions. This narrows the issue down to the one and only question—*WAS IT INVENTION TO PUT THE STRANDS ON THE TUBE?*

If these strands were new for protecting tubing Brinkman would have made an invention, or even had he been the first one to put such strands on corrugated tubing doubt might have resolved in his favor.

But what do the prior patents disclose? The patent to Kelso, 606557, Exhibit D 1 *b*, discloses a tube covered with a sheath A formed of metal strands *a* wound helically in opposite directions. It is true that the tube is formed of rubber—rubber hose—but the function of the sheathing is the same; i. e., to protect against tensile strains and also lateral pressure. Note also the specification, page 1, lines 46 et seq., that the metal braid is to be applied to objects (tubes) from *one-half* an inch to three.

Appellant contends, page 9 of his brief, that the Titeflex tube (illustrated in patent No. 1198392) was "superior as a flexible tube to what had gone before" but was subjected to twisting force, but that the helical strips prevented twisting and elongation, and that there was invention in that combination. That "combination," if we could so designate it, however, is shown in the Rudolph patent but not claimed. Rudolph illustrates a spiral tube (specific form not described in detail) which tube is protected by metallic strands spirally formed and which undoubtedly functions the same as do appellant's strands. If appellant's contention were tenable the number of patents in this subject matter would be limited only by the number of pipes or tubes that could be found in the art. Obviously Rudolph in 1913 when his patent was granted (filing date Feb. 27, 1909) realized that the combination was old and confined his claim to the "coupling" or specifically to the manner of